

A land-use management model for the private wildlife industry of South Africa

W. von Solms



orcid.org/0000-0003-2769-9168

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Promoter: Prof. P. van der Merwe

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Student number: 27513777

PROOF OF LANGUAGE EDITING

Rod Taylor

Language editor & proofreader

Trading as
Direction Training

**215 Republic Road
Randpark 2194**

**Telephone: 084 716 6588
Email: dtraining@iafrica.com**

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To whom it may concern

Language Editing – Thesis – W. von Solms

I have reviewed the thesis entitled “A land-use management model for the private wildlife industry of South Africa” in terms of spelling, language and grammar and have made recommendations to the author concerning the changes necessary.



R. Taylor
MBA BSc DTM

DECLARATION

I. **Woudi von Solms** declare that the thesis entitled “***A land-use management model for the private wildlife industry of South Africa***”, is my own unaided work except in areas duly acknowledged. The thesis is submitted for the degree ***PhD (Tourism Management)*** at the North-West University (Potchefstroom Campus). It has not been submitted for any other degree to any other university.

.....

Woudi von Solms

Date: November 2018

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ABSTRACT

The purpose of this research study is to develop a land-use management model for the private wildlife industry of South Africa. Currently there is no land-use management model available that indicates the most beneficial combination of land-use forms. This research study focuses on five land-use forms. The first is biltong and trophy hunting. Biltong hunting is mostly done by South Africans whilst trophy hunting is mostly done by international tourists. In both cases, popular species for hunting are gemsbok, impala, springbok, blue wildebeest, kudu and warthog. The second land-use activity is breeding. Breeding can involve high value animals that include species such as buffalo, sable and bontebok. Alternatively, breeding practices can focus on plains game that include springbok. Plains game and high value game can be bred in controlled environments or extensive environments. Controlled environments involve areas on the farm being fenced off. This prevents species in the controlled environments coming into contact with predators and results in the development of better animal traits and characteristics that are less likely to develop in extensive or natural environments. Extensive breeding involves less human interference than controlled breeding. Animals are free to move over large natural areas with sufficient water and vegetation. Ecotourism forms part of wildlife tourism which involves consumptive and non-consumptive activities. Consumptive activities include, for example, hunting that has already been discussed. Non-consumptive activities forms part of ecotourism and includes activities such as hiking, game drives and bird watching. By-products include using the skin, horn, meat and other parts of the animals to produce medicine, leather products and arts and crafts. Mixed farming involves incorporating stock or crop farming with one or more of these land-use forms that include wildlife. These land-use forms are impacted by legislation and natural factors such as the natural habitat, diseases and climate change. In addition, there is specific infrastructure that assists private wildlife establishment owners to better manage land-use forms.

Existing literature summarises these land-use forms and impacts. In addition, primary qualitative research was conducted by means of non-probability sampling. In total 223 private wildlife establishment owners were interviewed at wildlife auctions. Interview questions stemmed from a research instrument that focused on six areas. The first was demographic details that included the general location, habitat, size, years of and reason for the operations, species owned and employee breakdown. The second was land-use information to determine the land-use forms implemented on private wildlife establishments. The third was economic information that gathered information on past and future expenditure and investments and the extent to which capital was invested in land, animals

and infrastructures. The fourth focused on challenges experienced. The fifth on future expansions and the sixth on general comments not already mentioned.

Results obtained from interviews indicated that hunting, breeding and mixed farming are the most popular land-use forms incorporated on private wildlife establishments. Ecotourism and by-products are incorporated minimally, however this does have growth potential. The results were similar for most provinces, except for the KwaZulu-Natal province that focuses predominantly on ecotourism. The study also identified themes that allow specific challenges, past and future investment opportunities and reasons to start or expand operations to be classified, grouped and better explained.

The study contributed to literature by summarising land-use forms and the various impacts, especially in terms of legislation as no other literature source could be found that summarises and compares national and provincial legislation. In addition, the research study made a practical contribution. The primary data and secondary data were combined to develop a land-use management model. The land-use management model will assist private wildlife establishments in terms of the most productive land-use forms as well as internal and external factors that must be considered during land-use decisions. Lastly, the study contributed methodologically. A new research instrument was developed that focused on demographic, economic, land-use, challenges and future considerations.

Two major conclusions stem from secondary literature that relates to the land-use forms and the impacts as well as results from primary research. The first conclusion relates to land-use forms. Secondary research summarised existing literature on the five land-use forms. Primary research indicated that, of these five land-use forms, breeding, hunting and mixed farming are the most popular. Mixed farming, even though crop and stock farming does not include wildlife, is seen as an important land-use form involving land-use in conjunction with wildlife. The popularity of ecotourism and the number of by-products that exist were discussed based on secondary research. Primary research shows that ecotourism and by-products are incorporated on a smaller scale than breeding, hunting and mixed farming. A possible reason for this is legislation – especially in terms of by-product exports and imports. The second conclusions stem from impacts or additional considerations. Secondary research focused on the natural environment, climate change and disease as well as infrastructure and legislation. Primary research confirmed these impacts and considerations, but also brought to light other considerations, impacts and factors. Some examples are the economy, government, family and nostalgia and management.

Key words: Wildlife, land-use, hunting, breeding, ecotourism, wildlife tourism

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ABBREVIATIONS AND ACRONYMS

CD	Corridor disease
CITES	Convention on International Trade in Endangered Species
CoAE	Certificate of Adequate Enclosure
DAFF	Department of Agriculture, Forestry and Fishery
DEA	Department of Environmental Affairs
DEDEAT	Department of Economic Development, Environmental Affairs & Tourism
DNA	Deoxyribonucleic Acid
FMD	Food and Mouth disease
IFAW	International Fund for Animal Welfare
INTOSAI	International Organisation of Supreme Audit Institutions
IOCB	Indian Ocean Coastal Belt
IUCN SSC	International Union for Conservation of Nature Species Survival Commission
KZN Wildlife	KwaZulu-Natal Wildlife
LADA	Land Degradation Assessment
LSU	Livestock unit
NAMC	National Agricultural Marketing Council
NEMBA	National Environmental Management Biodiversity Act
NRCS	National Regulator for Compulsory Specifications
SAVA	South African Veterinary Association
TOPS	Threatened or Protected Species
UConn	University of Connecticut
USA	United States of America (arrange alphabetically)
WRSA	Wildlife Ranching South Africa
WWF	World Wildlife Foundation

CHAPTER 1

INTRODUCTION AND PROBLEM STATEMENT

1.1 INTRODUCTION

Southern Africa has been a popular wildlife destination since the 17th century. Sea travel and, later, rail travel, made it easier for Europeans to reach Southern Africa to experience its wildlife (Suich, *et al.*, 2009:5-6). The development of the muzzleloader, mining and the belief that wildlife transmitted diseases to domestic animals led to vast numbers of wild animals being killed between 1780 and 1880 – mainly due to a lack of conservation consciousness and illnesses such as Rinderpest and Naga-illness (Suich, *et al.*, 2009:5-6; van der Merwe & du Plessis, 2014:5).

The decreasing amount of wildlife led to conservation laws being developed and, in 1858, legislation was implemented that specifically pertained to the conservation of elephants and buffalo (Suich, *et al.*, 2009:6-7). In 1874 legislation stated that hunters must have permits and licences to hunt during specific months of the year (van der Merwe & du Plessis, 2014:5). In the early 1900s, the government decided to put land aside for the conservation of wild animals and this led to the establishment of the first national parks in Southern Africa – This included the Kruger National Park (Suich, *et al.*, 2009:6-7; van der Merwe & du Plessis, 2014:5).

Wildlife outside national park areas were seen by the private sector as unprofitable and were considered problematic until the establishment of national parks led to the development of game viewing for tourism purposes (Suich, *et al.*, 2009:6-7; van der Merwe & du Plessis, 2014:5). The development of a tourist market that spent money on viewing and hunting wildlife, changed the perceptions of the private sector (livestock farmers) (van der Merwe & du Plessis, 2014:6; Lindsey, *et al.*, 2013b:41). Legislative changes allowed private landowners to own wildlife which led to the conversion of livestock farms into game farms (van der Merwe & du Plessis, 2014:6; Lindsey, *et al.*, 2013b:41).

Today, approximately 16,8% of land in South Africa is used for commercial wildlife ranches which equates to one fifth of total agricultural land and amounts to approximately 10% more than government-owned wildlife establishments (Dry, 2013).

The main activities or pillars of the private wildlife industry are hunting (biltong and trophy), breeding and game sales (animal husbandry), producing by-products and wildlife tourism that includes ecotourism (Endangered Wildlife Trust, 2016:1; Janovsky, 2015:1; Conservation Action Trust, 2016; van der Merwe & du Plessis, 2014:7). Different private

wildlife establishment owners manage their land differently, implement different pillars and therefore apply different land-use management models (NRCS, 2012:1-2). Land-use describes the purpose for which a specific area of land is used and landowners use this description to determine which pillars to implement (NRCS, 2012:1-2). Due to the size of the wildlife industry, and the fact that wildlife land-use forms have not been well documented in terms of land-use management, this research aims to develop a land-use management model for the private wildlife industry (Uys, 2016; Aylward & Lutz, 2003:251; Pienaar, 2010:1-2; Department of Economic Development, Environmental Affairs and Tourism, 2010).

The aim of this chapter is to discuss the background of the wildlife industry in general, state the research question, identify primary and secondary objectives, state the contribution of the study, the methodological approaches that will be employed and definitions for the main concepts important for the research study. This chapter is divided into eight sections. The sections are indicated in Figure 1.1 below.

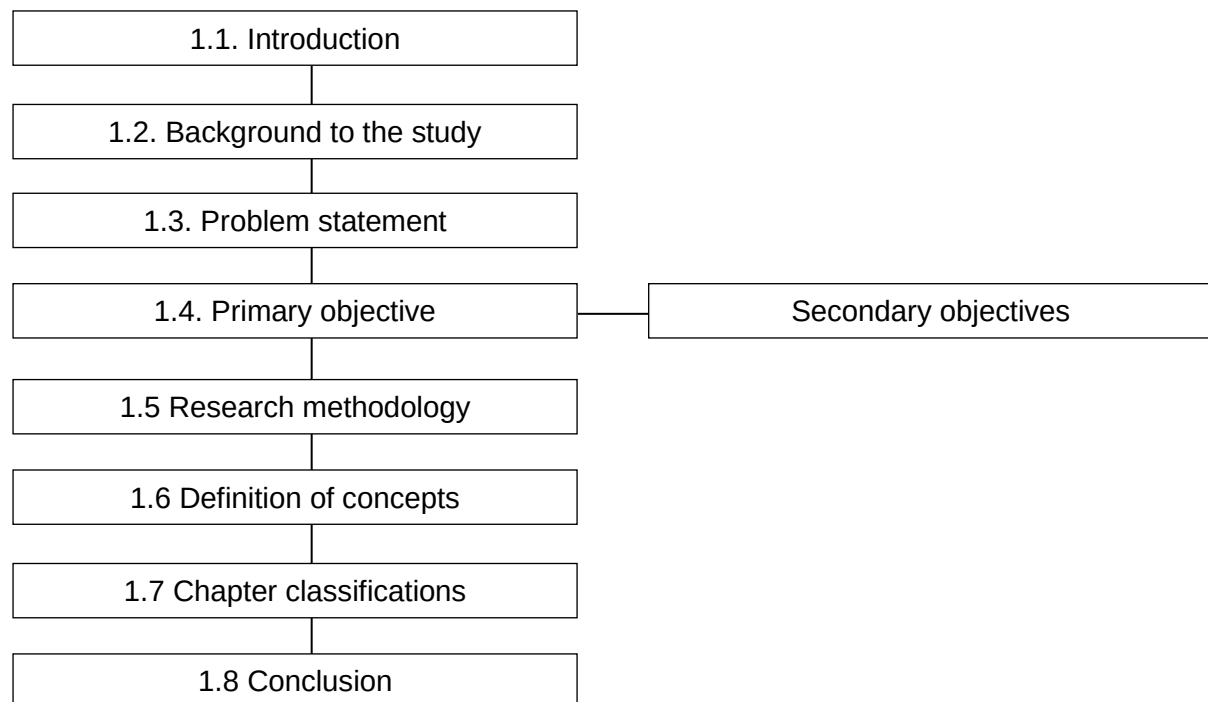


Figure 1.1: Chapter layout

1.2 BACKGROUND TO THE STUDY

The definition of 'management' varies depending on the discipline or industry under consideration (Gautam, 2013). In terms of wildlife management, it is helpful to first understand that the wildlife industry can be defined as the management of land to increase, decrease, sustainably harvest or monitor wild, undomesticated fauna. The wildlife industry is further concerned with the interrelationship between different wild animals and their habitats (Krausman & Cain, 2013:5). The habitat includes the soil, climate, plants, water, nutrients

available, other animals and microscopic animals that impact the ecosystem (Bothma & du Toit, 2016:109-111; Park & Allaby, 2013:93). Changes in the ecosystem can impact conservation. Conservation is aimed at ensuring that the wild animals' habitat is not destroyed or damaged in the long term (Park & Allaby, 2013:93).

Private game farm managers can manipulate the habitat and ecosystem, especially if the game farm is small and the manager knows and understands both the habitat and animal behaviour (Bothma & du Toit, 2016: 5-6,29-31). The desirable level of human influence within the wildlife industry can be debated, but management definitions agree that human activity is necessary to reach specific goals (Gautam, 2013). Management must prevent, hinder or avoid environmental damage that stems from poor management as this can lead to increased animal stress which can have negative consequences. Negative consequences involve a reduction in revenue received from hunting (Jensen, *et al.*, 2014:377), fewer trophy animals, over harvesting and a lack of conservation (Crosmar, *et al.*, 2015b:136). The ideal is to manage a private game farm passively in such a manner that human influence causes minimal damage to the environment (Bothma & du Toit, 2016:5-6,29-31). Habitat manipulation may be necessary if management finds it must increase, decrease or stabilise wildlife numbers; or if management wants to use the habitat for recreational activities (Park & Allaby, 2013:93).

Generally, land-use involves management operations on land with the aim of producing specific goods and services from that land. The goods and services obtained from the land depend on particular eco-systems and socio-economic market forces (Pretorius, 2009:3-4). Land-use is further influenced by changes in natural and economic environments (Pretorius, 2009:3-4; Otieno & Muchapondwa, 2016:5-7). Soil and climate in specific areas allow for particular agricultural or livestock land-use models. The availability of rain as well as climate change influence the ideal conditions for specific land-use forms. Farmers that have the capital and finances can adapt land-use models and offer additional activities that can generate additional income under severe or difficult environmental and economic conditions.

Examples are crop farmers that change land-use models to incorporate new types of drought-resistant crops; crop farmers that change land-use forms to incorporate livestock; and livestock farmers that change their land-use form to include wildlife establishments (Otieno & Muchapondwa, 2016:5-7). On wildlife establishments, there are different land-use forms that include the four pillars mentioned. There are also multiple environmental considerations that impact the pillars and animals on a specific farm. These pillars must have commercial value which involves making a profit through activities (Cambridge Dictionary, 2016; Macmillan Dictionary, 2016). Profit, however, should not be the only goal of privately-owned businesses (Stimpson & Joyce, 2014:24). Goals should also include

sustainability which improves biodiversity, reduces habitat loss, increases animal welfare, benefits local communities and increases wildlife's economic value (Selier & Di Minin, 2015:131). If the natural habitat and game that depend on the habitat are not managed in a sustainable way, long-term damage can occur that hinders future sustainability. Proper management is imperative and certain activities have developed into pillars that assist with the sustainability of the game farm industry (Pirota & Lusseau, 2015:729). The four pillars should incorporate long-term conservation goals that involve the sustainable use, protection and control of the habitat or natural environment of wild animals (Roth & Merz, 1997:1-2).

Hunting, the first pillar, has become popular in South Africa because of the decrease in game in other countries (Janovsky, 2015:1). Biltong and trophy hunting are the two main reasons for hunting. Biltong hunting is mostly done by South Africans who hunt to obtain game meat and biltong (van der Merwe, *et al.*, 2014:379). The second reason for hunting is for trophies. This mostly involves international repeat visitors that may travel alone or bring with them fellow hunters or non-hunting individuals. Some hunters may be interested in additional activities. However, the majority only travel to hunt (Bothma & du Toit, 2016:668-671).

Breeding (husbandry) and game sales is the second pillar and involves the breeding of high value and plains game that further increase the revenues received from hunting (Janovsky, 2015:1). Examples are sable and roan of different colour variants which show opportunities for hunting and reach high prices at game sales (Endangered Wildlife Trust, 2016; Kriek, 2015). The popularity of plains game has also increased continually from 2003 until 2012. Increases in the breeding of other high value game, plains game and colour variants cause the growth in this pillar of the game industry (Groenewald & York, 2013:3). In addition, the catching, insurance, transport and auction of live game that form part of game breeding and sales have made this pillar easier to incorporate into land-use forms (Janovsky, 2015:1).

Wildlife tourism is the third pillar and, especially if community-based, helps to reduce poverty and increase responsible tourism practices that incorporate sustainability and increased conservation (Mearns, 2011:136). Wildlife tourism includes elements of human relations, nature-based tourism, eco-tourism, consumptive activities and rural tourism (Page & Dowling, 2002:83). Examples of wildlife tourism activities are game viewing and bush walks in remote and uncrowded destinations (de Witt, *et al.*, 2014:180).

The fourth pillar is by-products. By-products include products that are made from different parts of a wild animal (Department of Arts and Culture, 1998:8; Festa-Bianchet, 2012:12). The parts of the animal used include the meat, skin, bones and horns. These products, in

turn, produce meat, leather products, arts and crafts, and medicine (Shava, 2015:9-11; Soewu, 2008:42425).

In addition to the four pillars, private wildlife establishments also incorporate mixed farming into land-use. Stock and livestock farmers are more prone to influences from climate change than game farms. Climate change is one reason why livestock farmers are changing their land-use model to include game. Privately-owned wildlife increases opportunities for conservation with which the public sector often struggles. Generally, mixed farms are better off than purely livestock or crop farms (Otieno & Muchapondwa, 2016:1-3). The reason is that game are less water dependent, roam more and require less management input costs, are less prone to diseases and can be kept in higher quantities – especially if browsers and grazers are mixed (Chiyangwa, 2018:38).

These four pillars require additional considerations. The first is additional infrastructures to satisfy human needs, but these can also jeopardise animal habitats (van der Merwe, *et al.*, 2014:1). Examples of infrastructures are roads, viewing facilities near water holes, hunting facilities, staff accommodation and bomas or holding pens for animals (Bothma & du Toit, 2016:142-144, 152,163-164). Other considerations are the size and location of the game farm, the number of employees, the type and variety of activities offered, costs, laws, weather conditions and biomes.

The size of a game farm influences the type and number of animals that private game farm owners can own. Small game farms are less than 1 000ha, medium game farms between 1 000ha and 5 000ha and large game farms are between 5 000ha and 15 000ha (Ekofokus, 2011:1-2). The bigger the game farm, the fewer restrictions there are on the private game farm owners (Ekofokus, 2011:1-2). Larger game farms do not necessarily stock large numbers of game as finance and habitat influence the owners' or managers' decisions concerning the amount of game. To ensure that the amount of game does not jeopardise the sustainability of the habitat, managers and owners must consider the 'carrying capacity' of the farm which is calculated as the number of Large Stock Units (LSU) that can be accommodated on one hectare of land. A LSU is calculated based on grazing/browsing and the animal gaining 500 grams per day (Furstenburg, 2010). A grazer needs approximately 4ha per animal while browsers need 11ha per animal (Bothma & du Toit, 2016:3-4).

A third consideration is the biomes in the geographical areas where the private wildlife establishments are located. South African biomes consist of Desert, Succulent and Nama Karoo, Fynbos, Grassland, Thicket, Wetland and Forest (Environment and Tourism, 2005). The biome will influence the species kept on a wildlife establishments. Kudu, for example, require biomes that have dense bush (thicket and forest) to hide, but a less dense

environment for feeding. Impala prefer biomes with short grass for feeding but, similarly to Kudu, need dense bush to survive (Furstenburg, 2010; Bothma & du Toit, 2016:42). The anatomical characteristics of an animal, such as the animals' size, mouth and digestive system, impacts the animals' preference for certain plants. Preference and palatability can relate to the smell and taste of plants as well as the level of nutrients the plant contains. The plants within a biome must be at an adequate height for animals to reach, be of good quantity and quality and be sufficient during dry seasons so that different species that eat the same plant species can obtain sufficient food and nutrients (Bothma & du Toit, 2016:345-350).

A fourth consideration is legislation. Animals can only be translocated if a permit is issued. This permit states that, if an indigenous species is being translocated within a natural distribution range as indicated on the maps, a habitat assessment must have been done and a wildlife translocator must manage the translocation (NEMBA, 2016:7-10). Within the Western Cape (for example), distribution ranges were extended and certain herbivore species, as identified by Cape Nature, were allowed to be transferred to any environmental and ecologically approved location within the province (Brink, 2010). If vulnerable, endangered or threatened species are kept on a farm, a different permit is necessary. Organisations or individuals that are wildlife traders, registered breeders, sanctuaries or rehabilitation centres are eligible to obtain permits, all of which involve different restrictions. Other types of permits include: a standing permit for all landowners of private game farms; possession permits (if a person wants to keep a wild animal as a pet); hunting permits (if the game farm is registered as a hunting farm); and personal effects permits (if an individual or organisation trades in wildlife) (European Union, 2013:82). Certain legislation and permits pertain to specific animals such as cheetah, lion and leopard. Other laws that relate to cheetah and leopard relate to the hunting and transport of such animals: no leopard or cheetah may be bought, sold or exported unless proof is provided that the animal will not be used for illegal activities (European Union, 2013:80-81). Other laws pertain specially to the preservation and conservation of rhino, buffalo and elephant (Mauck, 2013:59).

Therefore land-use models can differ from province to province due to the different provincial conditions such as biomes, animal diseases, climate, legislation and infrastructure.

1.3 PROBLEM STATEMENT

According to Taylor, *et al.* (2015:8-9), there is a lack of information on the wildlife sector – especially regarding their land-use forms and animals. Current literature highlights specific industry segments that makes it difficult to understand the combined economic, social and ecological benefits of the wildlife industry and the different pillars (Taylor, *et al.*, 2015:1,8-9).

The United Nations has drawn up land-use maps that indicate land-uses for different areas. These land-use forms involve forests, grasslands, shrubs, crops, agriculture wetlands, urban areas, bare and sparsely vegetated areas that offer information on livestock and agricultural activities (LADA, 2011). There are maps available that give information on the South African biomes, but the maps lack details on land-use forms that are appropriate for these biomes. Internationally, there are maps of livestock and crop and other agricultural land-uses (Pretorius, 2009:4-8;15-17). Other maps show areas where specific animals occur in South Africa. These maps help to make decisions that relate to cross-provincial translocation and show information that relates to the preferred vegetation and the translocation range and natural distribution of the animals (Environmental Affairs, 2016).

However, there is a need for charting where land-uses can be characterised based on eco-systems and what type of land-uses the eco-systems can support – essentially a combination of these land-use records. Appropriate land-use needs additional information such as the size of farms, the availability of water and climatic and socio-economic factors (Pretorius, 2009:4-8).

The private wildlife industry has shown the fastest growth in the agricultural sector since 1996 (NAMC, 2006:vi-vii,6-8). The problem is that, unlike other agricultural sectors, the private wildlife industry has grown in the last 20 years without any land-use models specifically adapted to include best practices and encourage high growth and profit for the wildlife industry (Taylor, *et al.*, 2015:1,8-9). Thus, there is a need for a land-use management model that can aid the wildlife industry to grow through sound management decisions while simultaneously preventing damage to eco-systems or the production of poor quality goods and services (Pretorius, 2009:4-8). Furthermore, the land-use model must not simply take into account management decisions and products, but also the impact on the wildlife industry. Examples of impacts that may be considered are droughts, conservation, job creation, a potential increase in tourism and sustainable development (NAMC, 2006:vi-vii,6-8).

A land-use management model will guide existing game farm owners and new and emerging game farmers on how best to choose and utilise land. Knowledge on the most profitable and sustainable systems and the factors that impact these activities will ease decision-making. Current, future and new emerging private wildlife establishment owners will benefit if this problem is solved by using a land-use management model to gain an overview of the wildlife industry and the factors that should be considered during management decisions (Ayinke, 2011:4). Therefore the problem that this research would address is developing a land-use management model for the private wildlife industry.

1.4 OBJECTIVES OF THE STUDY

The main research objective is:

To develop a land-use management model for the private wildlife industry of South Africa.

Based on the main research objective, secondary research objectives have been identified.

These research objectives are:

Objective 1: To gain information on the of the four pillars of the private wildlife industry, infrastructure needed and mixed farming practices in South Africa. (chapter 2)

Objective 2: To analyse the biomes, climate change and diseases that impact land-use and wildlife species of the private wildlife industry. (chapter 4)

Objective 3: To investigate current legislation and its impact on the species and land-use practices of the private wildlife industry. (chapter 3)

Objective 4: To conduct research on the current land-use of the private wildlife industry in South Africa. (chapter 5)

Objective 5: To draw conclusions and make recommendations on land-use management in the private wildlife industry and to give the contribution of this research. (chapter 6)

1.5 LITERATURE STUDY

The research objectives related to secondary research (objectives 1 to 3) will be reached by means of secondary research. Existing literature will be consulted that include journal articles, website and books. The literature study will be based on the four pillars of the private wildlife industry (breeding, hunting, ecotourism and by-products), mixed farming, infrastructure, legislation, natural elements and animal diseases. Throughout the literature study the aim will be to consult literature that are current, correct and applicable.

1.6 METHOD OF RESEARCH

This section provide an overview of the research process followed.

1.6.1 Methods of collecting data

Apart from secondary research collected in the literature study, this study also makes use of primary research. Primary research can involve qualitative, quantitative and mixed method research. Qualitative research focuses on understanding experiences, meaning, purpose and the reality of a scenario through, for example, conducting interviews (Harwell, 2011:147-148, Techo, 2016:1). In quantitative research, figures, numbers and statistics are used to make predictions. Such predictions often allow for different scenarios or results to be

replicated or generalised (Techo, 2016:1). In mixed method research quantitative and qualitative research is combined to get a full understanding of the phenomenon that is being researched (Harwell, 2011:147-151, Techo, 2016:4).

Qualitative research will be used in this research study. A semi-structured questionnaire will be used to gather information on the attitudes, strategies, environment and understanding of experience of the sample (Hammersley, 2013:1).

1.6.2 Sample

A population refers to the total number of subjects that exists that relate to a specific study (Taherdoost, 2016:19). In this study the population refers to all private wildlife establishment owners in South Africa. A sample refers to a selection of the subject that constitute the population (Taherdoost, 2016:20). The sample for this study will be the private wildlife establishment owners of South Africa that attend private wildlife auctions from 2016 to 2018 in the nine provinces of South Africa. Non-probability or purposeful sampling methods were used. Non-probability sampling involves a small sample that has information on a real-life phenomenon. In this case the private wildlife industry has specific knowledge that the researcher needed to complete the study (Taherdoost, 2016:22, Maree, 2016:79; Martella, *et al.*, 2013:305). The sample will be chosen at random and participation is voluntary.

1.6.3 Development of measuring instrument

A new semi-structured questionnaire was developed. Both literature and industry-experts were consulted. Industry experts include Dr Dry (old WRSA-president), Professor Flippie Cloete (Agricultural economist), Adri Kirsthof (CEO of WRSA) as well as the research committee of the WRSA. The newly developed semi-structured questionnaire gave the interviewer control over the direction of the conversation and the topics that needed to be discussed during interviews (Datko, 2015:142). The semi-structured questionnaire used consists of six sections. These are demographic data, economic or financial data, land-use, challenges, future investments and other information. The questions that make up the six questions stem from the literature review as well as consultation with industry experts.

1.6.4 Survey/Collation of data

Because qualitative research is used, Creswell's (2009) six-step process will be applied. This process is explained in detail in chapter 5 (paragraph 5.2). The semi-structured questionnaire was tested at a wildlife auction after which adjustments were made. Interviews were then held using the semi-structure questionnaire at wildlife auctions across South Africa. In total, 223 interviews were held from 2016 to 2018 in the nine provinces of South Africa. No interviews were held at Gauteng wildlife auction, however,

Gauteng provinces' private wildlife owners were interviewed in other provinces. The number of interviews attended in Limpopo, the North West and Northern Cape provinces were higher as research indicate that these provinces are popular wildlife destinations.

1.6.5 Data recording and analysis

Responses from the interviewees will be recorded and analysed using Excel. The results will be summarised in chapter 5 for South Africa as well as for each of the nine provinces in South Africa.

1.7 DEFINITION OF CONCEPTS

Definitions of key concepts used in this research study are provided below.

1.7.1 Land-use

Land-use refers to the specific lawful usage of land for which authorisation and consent is given (South Africa, 2013a:12). Land-use further indicates how humans interact with their environment and how humans transform land, cause changes, aim to sustain ecosystems and receive benefits from land (Haines-Young, 2009:1). In terms of the private wildlife industry, land-use includes the farm size, activities, number of people employed, income generated, animal offtakes, conservation considerations and economic and social factors of land-use that incorporate wildlife (Taylor, *et al.*, 2015:1).

1.7.2 Private wildlife industry

Privately owned organisations or industries are owned by individuals, entrepreneurs or shareholders that make profit by selling products to customers. This is different from publicly owned entities which are owned by government and funded by taxes (Boye, 2002:98). The private wildlife industry of South Africa includes agricultural land and protected areas and contributes to conservation, the economy and Gross Domestic Product (GDP) through job creation, the supply of red meat, the increase of wildlife numbers and other activities that include hunting and tourism (Dry, 2013:2-9). The industry also is associated with the active and passive management of land to increase, decrease, sustainably harvest or monitor wild, undomesticated fauna and flora as well as their interrelationship with each other and their habitats (Krausman & Cain, 2013:5).

1.7.3 Game farm

Game farms are farm land that is converted from stock and crop farms (Dry, 2013:3). Such farm land is fenced land that includes infrastructure, wildlife species and enterprises that aim to sell live game, attract wildlife tourists and/or offer hunters the opportunity to hunt wildlife

species for meat (van der Merwe, *et.al.*, 2014:1). The terms game ranch and wildlife ranch are sometimes used interchangeably with the term game farm (Taylor, *et al.*, 2015:xi).

1.7.4 Wildlife ranch

Privately owned and fenced wildlife enterprise that has various species and generates commercial benefit from wildlife (hunting, meat production, game sales and infrastructure) (Endangered Wildlife Trust, 2016:1). Wildlife ranching can be extensive where there is limited human interference with wildlife or intensive where game is kept in fenced camps, bred in captivity and fed additional food not obtained from the natural environment (Taylor, , *et al.*, 2015:xi).

1.7.5 Conservation

Conservation involves different measures that help to ensure that the natural habitats in which fauna and flora occur are maintained (European Commission, 2012:1-3). Conservation involves the protection of nature. Conservation also aims to prevent harm, to prevent destruction and to prevent overuse of habitats and wild animals (Sandbrook, 2015:565). Conservation can also involve preventative measures that prevent the destruction of fauna and flora and the natural habitat. Protection, maintenance, management, restoration and sustainable use help to ensure long-term survival (Park & Allaby, 2013:93).

1.7.6 Wildlife tourism

Wildlife tourism involves a relationship or interaction between humans and nature which, if managed properly, will protect and conserve the environment (Curtin & Kragh, 2014:545-546). Wildlife tourism activities that involve encounters with non-domesticated animals, with animals in captivity or animals in their natural environment (Kruger, *et al.*, 2015:2; van der Merwe & Saayman, 2013:18). Within Wildlife tourism there are non-consumptive and consumptive activities that can be defined as follows:

1.7.6.1 Non-consumptive activities

In the case of non-consumptive wildlife tourism activities animals are not removed from the natural habitat (Washington, 2014:6). Non-consumptive activities include ecotourism activities such as bird watching and game viewing (Meletis & Campbell, 2007:851).

1.7.6.2 Consumptive activities:

Consumptive tourism is defined as activities, such as hunting, that involve the removal of wildlife (Meletis & Campbell, 2007:851) or using animal body parts (Higginbottom, 2004:4).

Another reason is for wildlife to be moved from their natural environment to, for example, zoos (Washington, 2014:2).

1.8 CHAPTER CLASSIFICATION

Figure 1.2 below indicates how the rest of the study is laid out.

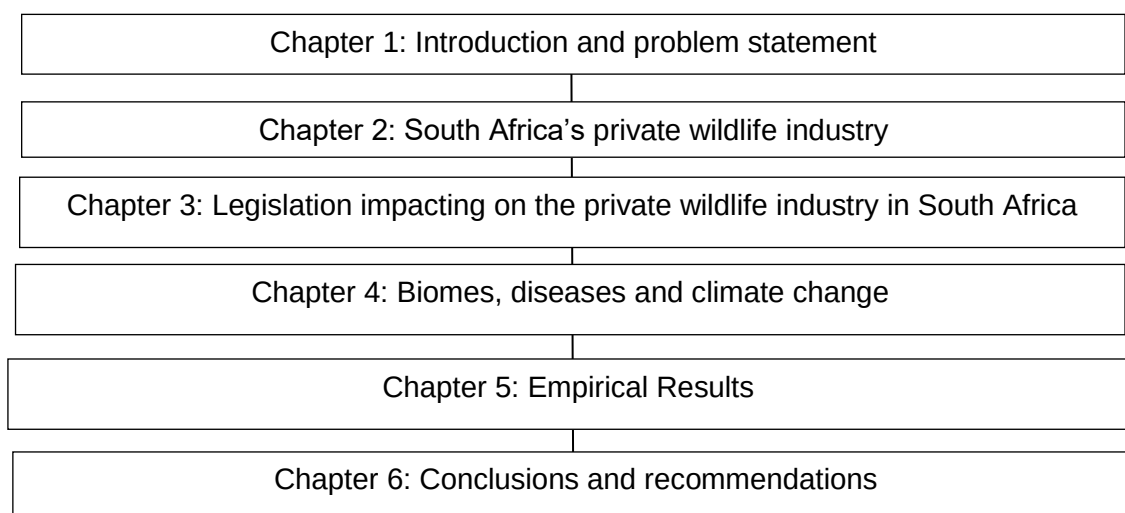


Figure 1.2: Chapter classifications

A brief explanation of each chapter is given below.

Chapter 1: Introduction and problem statement

Chapter 1 will briefly discuss all the major components of the research study. A theoretical background that indicates the importance of the study has been given. The sample, research questions, research objectives, methodology and key terms have also been explained. The aim is to give the reader a summary of the overall research study. An in-depth discussion will follow in the individual chapters.

Chapter 2: South Africa's private wildlife Industry

Chapter 2 will discuss the four pillars of the private wildlife industry as well mixed farming that can be combined with land-use forms that include wildlife. Infrastructure considerations will also be discussed. The discussion of the four pillars will focus on wildlife tourism, hunting, game breeding and sales and by-products. Secondary research will help the reader to understand the four pillars of the wildlife industry as current literature explains them.

Chapter 3: Legislation impacting on the private wildlife industry in South Africa

Chapter 3 will briefly mention the national legislation that impacts the private wildlife establishments in South Africa. This discussion will be followed by a more detailed explanation on different provincial wildlife legislation and how provincial legislation compares between different provinces.

Chapter 4: Biomes, diseases and climate change

Chapter 4 will discuss information on the natural aspects that impact private wildlife establishments. These include the different biomes in South Africa, animal diseases and the impact of climate change.

Chapter 5: Empirical results

Chapter 5 will explain the research methodology which will include a discussion on the sample, data collection process and data analysis method of this research study. The results obtained from primary research will also be summarised and discussed. The results will assist in developing the province-specific land-use management model. The land-use model will indicate the best combination of the four pillars allowing for the factors that impact the four pillars and game farms in general.

Chapter 6: Conclusions and recommendations

Chapter 6 will summarise the results of the study as they relate to the research objectives. The discussion will involve the province-specific land-use management model that stems from research findings and secondary data collection. Additional contributions that add to the value of this and possible future research projects will also be discussed.

Chapter 6 will also provide conclusions and recommendations. Conclusions will be drawn based on findings discussed in chapter 6 whilst recommendations will be made as to how the research findings can be used in future to add to the main research objective.

CHAPTER 2

SOUTH AFRICA'S PRIVATE WILDLIFE INDUSTRY

2.1 INTRODUCTION

Today, approximately 50 years after the first game farms were established in South Africa, the game industry has grown into an industry of significant size. It was indicated by van der Merwe, *et al.* (2010:105-107) that 80% of nature conservation in South Africa takes place on privately owned land, such as game farms. Land used for game farming from 1998 to 1999 increased between 300 000 - 500 000 ha per year (van der Merwe, *et al.*, 2010:105-107). This demonstrates the size of this industry.

As this industry has grown, four pillars have developed that, as indicated in chapter 1, can be used using different land-use forms. This chapter discusses the four pillars that can be combined into different forms of farming activities as well as mixed farming that has been identified in chapter 1 as an additional farming activity for some wildlife farm owners. The infrastructure needed for each of these pillars will be addressed. To continue the growth of the industry, it is imperative for game farms/ranches that the four pillars be understood concerning how they can be used to achieve a sustainable land-use form in the private wildlife industry (van der Merwe & Saayman, 2005:2). To assist in understanding, the chapter is divided into five sections as indicated below.

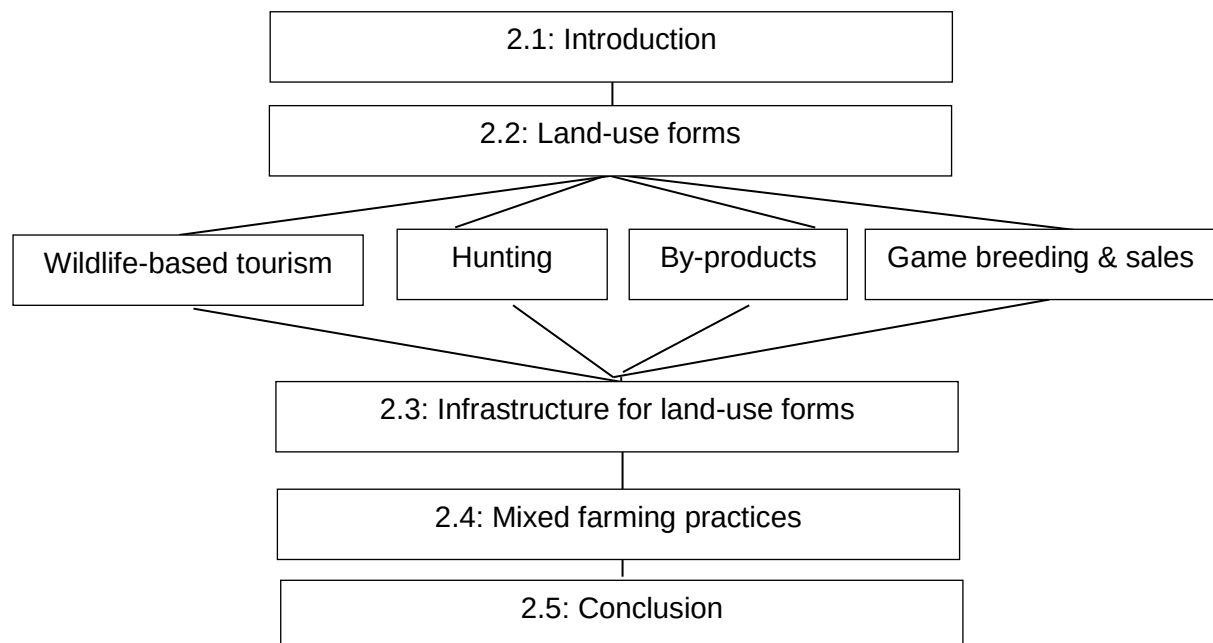


Figure 2.1: Chapter layout

First, the introduction is given which is followed by the second section which is a discussion of the four land-use forms – wildlife-based tourism, hunting, by-products and game breeding

and sales. The third part involves a discussion on mixed-farming where private wildlife establishments, in addition to owning wildlife, also participate in crop or stock farming. The fourth part involves a discussion on the infrastructure needed by these four land-use forms and lastly, a conclusion is drawn.

2.2 LAND-USE FORMS OF THE PRIVATE WILDLIFE INDUSTRY

The private wildlife industry consists of four pillars that can be implemented as land-use forms. Each of these pillars has subcategories which are depicted in the diagram below.

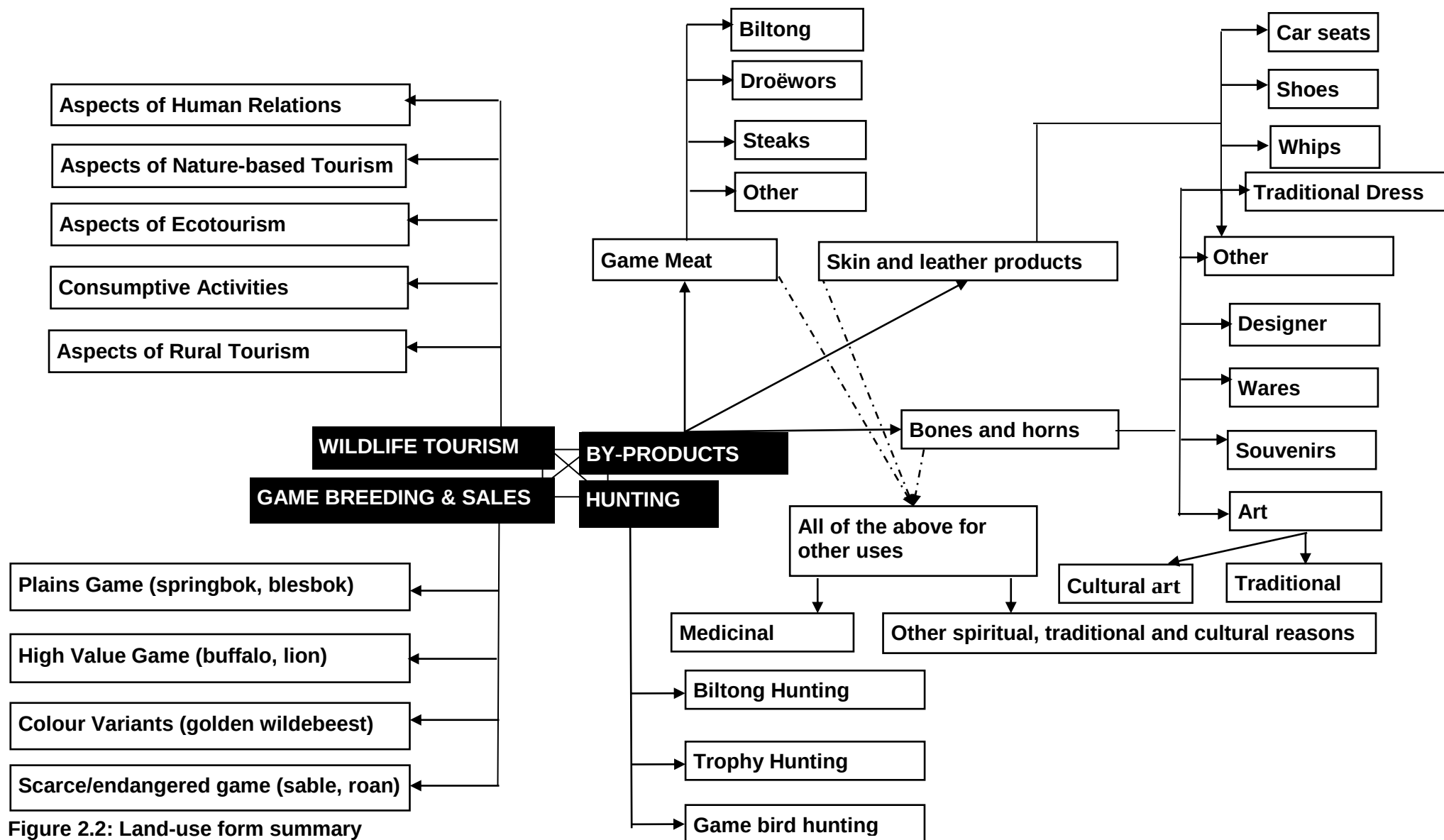


Figure 2.2: Land-use form summary

Source used: Page and Dowling (2002:83); Babb, 2013:22; SA Wingshooters, 2017; van der Merwe and du Plessis: 2014:1-27

Department of Arts and Culture, 1998:8; van Zyl, 2018:9-16; Shava, 2015:9-11; Soewu, 2008:42425

The four pillars are indicated in the centre of the diagram in black. From them, each of the pillars' sub-categories are indicated. The four pillars and the sub-categories are discussed below.

2.2.1 Pillar 1: Wildlife tourism

Wildlife tourism is any tourism experience that includes wildlife or non-domesticated animals that are viewed in a natural setting or captivity (Sinha, 2001:3; Higginbottom, 2004:2; Newsome, *et al.*, 2004:1-9). To better explain the term wildlife tourism, the model by Page and Dowling (2002:83) will be used (Figure 2.3).

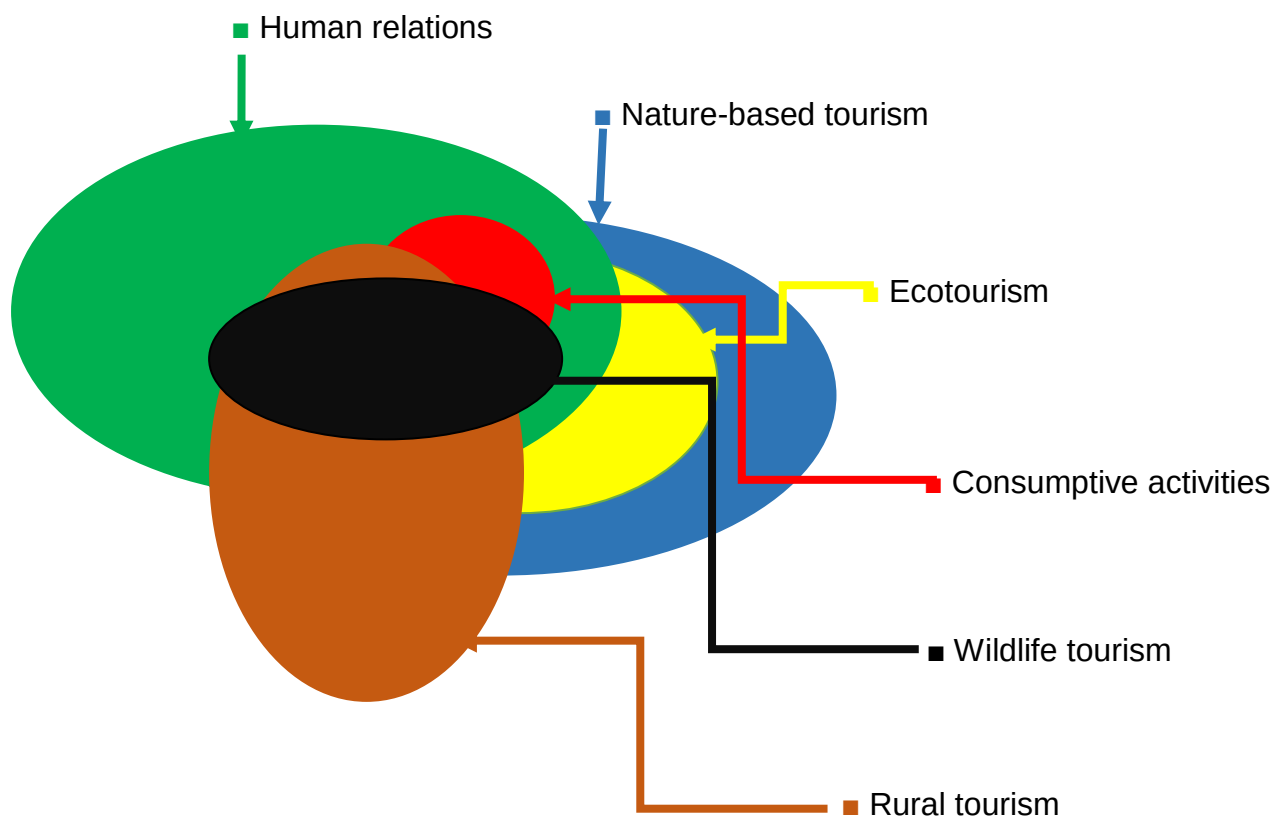


Figure 2.3: Wildlife tourism

Source: Page and Dowling (2002:83)

Figure 2.3 explains the considerations and concepts necessary to understand wildlife tourism. These considerations include nature-based tourism, rural and ecotourism, consumptive activities and human interactions. These considerations and their relation to each other are discussed next.

2.2.1.1 Nature-based tourism

Nature-based tourism is indicated in blue in Figure 2.3. Buckley (2003:1) states that tourism in natural areas may replace traditional farming practices as it can be more profitable. Buckley and Coghlan (2012:1-3) explain nature-based tourism as tourism that, regardless of the motivation and interests of tourists, involves the natural environment being the main reason to travel. According to Buckley (2009:5) and Maphalala (2014:5-7), this occurs when tourists travel to uncontaminated areas in which nature, animals, plants, vegetation and culture are studied, observed, contemplated and enjoyed. Buckley (2009:5) states that nature-based tourism can include any form or activity of tourism that involve natural features or that occur in the natural environment. Buckley and Coghlan (2012:2) and Maphalala (2014:5-7) state that nature-based tourism includes adventure and cultural tourism activities that are similar to those described in consumptive and non-consumptive tourism as long as the natural environment is the main reason for travelling (Buckley & Coghlan, 2012:2; Maphalala, 2014:5-7, Buckley, 2009:6). Nature-based tourism can therefore include scenery, topography, natural resources, wildlife, culture and adventure activities that occur within and have minimal impact on the natural environment.

2.2.1.2 Ecotourism

Ecotourism is indicated in yellow in Figure 2.3. The first definition of eco-tourism states that eco-tourism *involves travelling to relatively undisturbed or uncontaminated natural areas for studying, admiring and enjoying the scenery, wild plants, animals or cultural manifestations* (Higham, 2007:1). If cultural attractions are included, examples are visiting cultural villages and enjoying local food and festivities (Wilson, *et al.*, 2014:4-6). If cultures are included in the concepts of ecotourism, it is usually seen as secondary or complementary to the natural attractions (Wilson, *et al.*, 2014:4-6; Weaver, 2018:2).

The focus of natural attraction is predominant in later definitions. Higginbottom (2004:100) mentions that ecotourism only includes natural attractions. The definition explains ecotourism as environmentally-friendly and non-consumptive activities that occur in the natural environment where wildlife occurs (Higginbottom, 2004:100). Such ecotourism activities occur in small groups and incorporate educational aspects, awareness and knowledge of the natural environment. The educational and learning experiences that must be present for ecotourism to occur is what distinguishes ecotourism from nature tourism (van der Merwe, 2004:18-20; Weaver, 2018:2-3,5-6). Overall, the aim of ecotourism is to care for, conserve, educate and benefit the natural environment and the species cultures and communities that occur in such environments (Higginbottom, 2004:100; INTOSAI, 2013:11; de Witt, *et al.*, 2011:1139; Phiri & Okeyo, 2015:427; Willemsen, *et al.*, 2015:2; Newsome,

et.al., 2005:13-14). Examples of ecotourism's natural attraction activities are wildlife watching, hiking, walking safaris, photographic safaris and horseback trails (Kays, *et al.*, 2017:243; Newsome, *et al.*, 2005:13-14; Meletis & Campbell, 2007:851).

2.2.1.3 Human relations

Human relations is indicated in green in Figure 2.3. Page and Dowling (2002:83) describe human relations as the interaction between humans and animals. These interactions occur using various activities already mentioned such as wildlife photography, wildlife tourism or hunting (WWF, nd:26). The amount of human interaction in ecotourism and wildlife tourism is increasing because of the number of tourists that pay to stay in nature accommodation establishments and participate in wildlife-based activities is increasing (Tisdell, 2003:83-85; Lima & Green, 2017:72; Meletis & Campbell, 2007:850). These human interactions can change ecosystems and habitats when they participate in these and other activities (WWF, nd:26). Human behaviour should, therefore, be regulated to ensure that when humans participate in these activities and attractions in nature the quality of the habitat is maintained so that the positive impact on the environment is continuously experienced by wildlife and tourists – as mentioned under ecotourism in the previous paragraph (WWF, nd:26).

Such a positive interaction between humans and wildlife generally increases wildlife presence. For example, suitable habitat management encourages animals to stay in the geographical area which is also the areas where tourists participate in ecotourism and other activities (Morzillo, *et al.*, 2014:46).

2.2.1.4 Consumptive activities

Consumptive tourism (indicated in red) is the smallest component in Figure 2.3. Consumptive tourism is defined as activities, such as hunting, that involve the removal of wildlife or the direct use of wildlife (Meletis & Campbell, 2007:851). This includes travelling with the aim of killing animals and will be discussed as a separate land-use form under hunting (paragraph 2.2.2) (Sinha, 2001:3). Consumptive activities also involve using animal body parts (Higginbottom, 2004:4). This is not necessarily linked to tourism and is better linked to by-products and hunting which will be discussed later

2.2.1.5 Rural tourism

Rural tourism is indicated in brown in Figure 2.3. Rural areas are areas that are sparsely populated by people and where people may depend on the natural environment for survival (Department of Tourism, 2012:7; Gopaul, 2006:7). Rural tourism generally incorporates

tourism experiences that include cultures, traditions, small-scale enterprises, local people, heritage and other activities that relate to the lifestyle of the people that live in these rural areas (Ayazlar & Ahazlar, 2015:168-169; Gopaul, 2006:8-9).

These definitions do not include any mention of the natural environment, wildlife or tourism activities mentioned earlier. In the interest of this study, rural tourism involves people travelling to rural areas, a rural environment, wilderness areas or the countryside to participate in ecotourism and/or hunting activities (Ayazlar & Ahazlar, 2015:168-169; Gopaul, 2006:8-9). The natural and rural areas in which rural tourism occurs can include fields, woods, forests, mountains, deserts and areas that include water (Okech, *et al.*, 2012:38-40).

2.2.1.6 Wildlife tourism

Wildlife tourism is indicated in black in Figure 2.3. Wildlife tourism forms the centre of the figure as it overlaps with the other aspects mentioned in paragraphs 2.2.1.1 to 2.2.1.5. The reason is that wildlife tourism includes various aspects of all the other parts of the figure. Firstly, the activities occur in the same rural and natural areas where wildlife occurs. Secondly, the natural areas and activities serve as the reason why humans travel to these areas. Lastly, wildlife tourism includes passive non-consumptive ecotourism activities or active consumptive activities such as hunting (Newsome, *et al.*, 2005:16-17; Okech, *et al.*, 2012:38-40).

Wildlife tourism has been defined by numerous authors and organisations. INTOSAI (2013:9-10) defines wildlife tourism as tourists who enjoy natural areas and wildlife through both consumptive and non-consumptive activities (INTOSAI 2013:9-10). Sinha, (2001:1) and Stokes and Lowe (2013:3-4) mention that wildlife tourism involves human actors such as tourists, guides and accommodation managers who ensure that the industry grows. The definition appropriate to this study is that of van der Merwe and du Plessis (2014:1-27) that defines wildlife tourism as tourism that is based on encounters with non-domesticated animals. These encounters can occur in either the animals' natural environment or captivity and can include consumptive and non-consumptive activities (van der Merwe & du Plessis, 2014:1-27). Another definition by Newsome, *et al.* (2005:19-20) and Lima and Green (2017:73) provides a similar definition, but states that the activities can be passive or active. Examples of activities for wildlife tourism include hiking, game viewing, wildlife photography (passive and non-consumptive) and hunting (active and consumptive) (Stokes & Lowe, 2013:5,13; Newsome, *et al.*, 2004:1-9,44-45). The next land-use forms or pillar to be discussed is hunting.

2.2.2 Pillar 2: Hunting

Hunting is defined as a search for game or wild animals for food or sporting purposes (van der Merwe & du Plessis, 2014:1-27). Further, it can be defined as the killing, capturing, extraction or removal of wild animals from their natural habitat with the intent of killing them (van der Merwe & du Plessis, 2014:1-27; South Africa, 2010:18; Duffy, *et al.*, 2015:15). Regarding land-use form considerations, hunting can be divided into three categories which are depicted below.

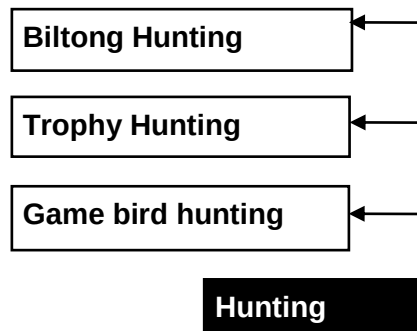


Figure 2.4: Different forms of hunting

(Authors own creation) Source used: Babb, 2013:22; SA Wingshooters, 2017; van der Merwe and du Plessis: 2014:1-27

The three categories are biltong, trophy and game bird hunting (wing shooting) (Cahoone, 2009:72). Each of the three categories is discussed below regarding the definitions, the hunters' profile and the popular species hunted.

2.2.2.1 Biltong hunting

Biltong is cured, dried and salted meat that is ready to eat (Jones, *et al.*, 2017:743). A biltong hunter is defined as a person participating in the activity of biltong hunting (van der Merwe & du Plessis, 2014:1-27). Biltong hunters (therefore biltong hunting) is the term used for local hunters as they predominantly hunt for biltong. Biltong hunting is defined as a cultural activity and can include hunting with a rifle or bow to obtain meat that is to be processed to produce biltong, droëwors (dried sausage), salami and other meat products (van der Merwe & du Plessis, 2014:1-27; Taylor, *et al.*, 2016:ix; van der Merwe, *et al.*, 2014:379). The profile of biltong hunters is mentioned next.

- *Biltong hunters profile*

Biltong hunters hunt game species mainly to make biltong and droëwors (dried sausage) or other game meat products such as salami, steaks as well as wet sausage (Taylor, *et al.*, 2016:3; Hoffman, 2007:6; van den Honert, 2015:8). These hunters, mostly middle-aged South African Afrikaans males, hunt predominantly in the Limpopo, Northern Cape and

North West provinces (van der Merwe & du Plessis, 2014:149-151). From a biltong hunters' perspective, obtaining the meat is the main reason for hunting (Bekke, *et al.*, 2011:344).

- *Preferred species*

The most popular species for biltong hunters include, but are not limited to, springbok, impala, gemsbok, kudu, blue wildebeest, warthog and blesbok (Taylor, *et al.*, 2016:31; van Hoving, 2011:24). These hunters will hunt both male and female animals.

The second type of hunting, trophy hunting, is discussed next.

2.2.2.2 Trophy hunting

Trophy hunting involves hunting only a small percentage of the herd (Muposhi, *et al.*, 2017:2-5), as a small number or percentage of animals have the desired characteristics to be considered "trophy animals" which are mostly mature adult males (van Hoving, 2011:22; IUCN, 2016:1; Palazy, *et al.*, 2011:1; Crosmar, *et al.*, 2015a:117).

- *Definition of trophy hunting*

The concept 'trophy' can refer to any part of the animal such as the head, skin, tusks, body or horns (IFAW, 2016:6; van der Merwe, *et al.*, 2014:379-380; Taylor, *et al.*, 2016:11). Trophy hunting can be defined as an activity where wildlife is hunted by means of a rifle, bow or similar weapon primarily for their horns (measured according to Rowland Ward and Safari Club International) and/or the skin in order to be displayed as trophies (van der Merwe & du Plessis, 2014:1-27).

- *Trophy hunters*

A trophy hunter is defined as a person participating in the activity of trophy hunting (van der Merwe & du Plessis, 2014:1-27). Trophy hunters are mostly international male visitors to South Africa who prefer to hunt in the Limpopo, Eastern Cape, Northern Cape, North West and KwaZulu-Natal provinces (van der Merwe & du Plessis, 2014:158-160; van Hoving, 2011:21). These hunters like to have a guarantee of hunting a trophy animal successfully. This means the part or characteristic of the animal sought as the trophy must remain undamaged when the animal is hunted (Lindsey, *et al.*, 2006:286; Taylor, *et al.*, 2016:xiii; Muposhi, *et al.*, 2017; IUCN, 2016:2-4; Strauss, 2015:22; IFAW, 2016:6).

- *Preferred species*

The most popular species for trophy hunters include, but are not limited to, buffalo, leopard, lion, eland, impala, warthog, springbok, gemsbok, blue wildebeest and kudu (Taylor, *et al.*,

2016:30; Lindsey, *et al.*, 2006:286). These species are similar to those popular among biltong hunters except for the dangerous game such as buffalo, lion and leopard.

2.2.2.3 Game bird hunting

Game bird hunters or wing shooters involve people hunting birds with shotguns (Morgan, 1998:5; Taylor, *et al.*, 2016:11). Game bird hunters require sufficient space to effectively hunt game birds and, although the activity is seen as inferior to trophy and biltong hunting, there is a growing market for game bird hunting (van der Merwe & Saayman, 2018:105). These hunters have a variety of options as to how to hunt various types of birds (Morgan, 1998:5).

Pass-shooting involves hunting birds as they fly – especially doves (Babb, 2013:22). These hunters wait in one location for birds to fly and then hunt them (Washington Department of Fish and Wildlife, 2016:12-13).

Walk-up shooting involves the hunter walking to where birds are found. The birds are disturbed from their cover and shot or caught on the wing. In many cases dogs are used to flush birds in this method and popular species to hunt are quail and grouse (Babb, 2013:22).

Jump-shooting involves hunting birds from dams or ponds. The hunter will stalk the birds from behind and shoot birds as they take flight (Babb, 2013:22; Washington Department of Fish and Wildlife, 2016:12). Popular species for jump-shooting are waterfowl.

Lastly, *decoys* can be used to surprise birds as they travel to and from feeding or watering sites. Popular species for decoying are ducks and geese (Babb, 2013:22). Decoying involves a camouflaged hunter waiting for birds to approach the hunting area which can include a pond, field or marine shoreline where birds are found. Birds are enticed to enter the hunting area by placing one or more decoys (artificial ducks) in an area that is visible from above. The decoys create the impression for birds that the specific area is attractive and hunters can then hunt the birds (Washington Department of Fish and Wildlife, 2016:11-12).

- *Bird hunters profile*

Research done in South Africa by Morgan (1998:3-5) showed that game bird hunters travel in larger groups of approximately 11 people (Morgan, 1998:3-5,12). More recent research by van der Merwe and Saayman (2018:2) indicates that 99% of game bird hunters are male and spend an average of R1 420 per hunting trip. The majority of game bird hunters are between 41 and 50 years of age, have a tertiary qualification and are married. (van der Merwe & Saayman, 2018:101-104). The wing shooters consist of national and international

visitors who prefer a variety of accommodation that varies from luxury accommodation to staying at hunting lodges and camping. Other activities enjoyed by wing shooters include bird watching, wildlife watching and wildlife hunting (Morgan, 1998:3-5,12). Wing shooters mostly visit agricultural land for bird hunting (Taylor, *et al.*, 2016:11).

- *Preferred species*

In South Africa, there are over 230 bird species that can be hunted by wing shooters. Examples of species are pew pigeon, upland and waterfowl, guinea fowl, francolins, partridges, ducks, helmeted guinea fowl and geese (SA Wingshooters, 2017; Morgan, 1998:11). South African game bird hunters prefer to hunt pigeons, guinea fowl, geese, pheasants and francolins (van der Merwe & Saayman, 2018:101-102).

2.2.3 Pillar 3: By-products

By-products involve decorative or practical items that are made from natural materials that originate from plants and animals (Department of Arts and Culture, 1998:8; Festa-Bianchet, 2012:12). The natural materials considered for this research project are only those from game hunted (animals) (Festa-Bianchet, 2012:12). These by-products can be in different forms as illustrated and described below in Figure 2.5.

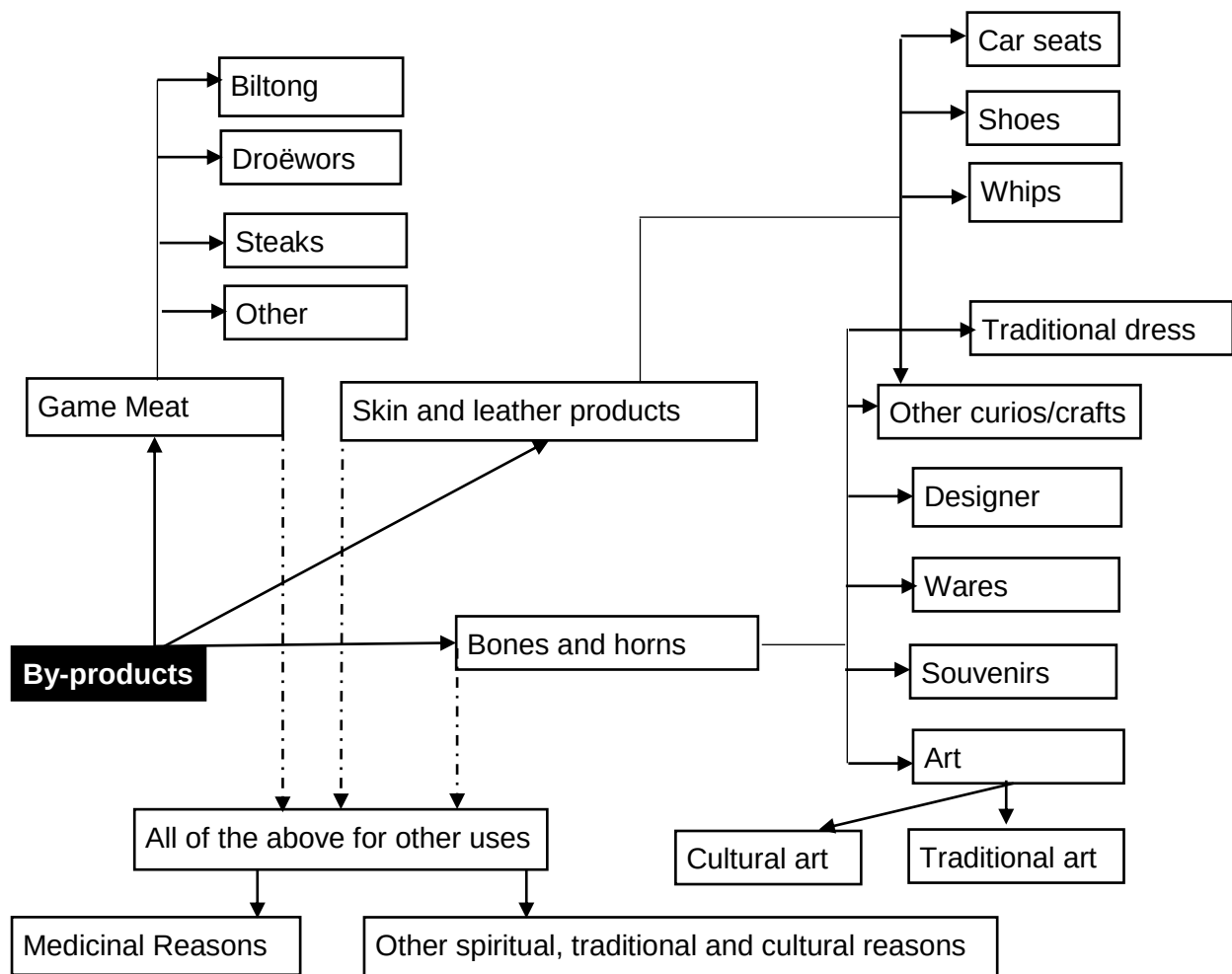


Figure 2.5: Different forms of by-products

(Authors own creation) Sources used: Department of Arts and Culture, 1998:8; van Zyl, 2018:9-16; Shava, 2015:9-11; Soewu, 2008:42425

The individual aspects indicated in the diagram above are discussed below.

2.2.3.1 Game meat

Game meat definition states that game meat comes from animals that are hunted or culled. Farm animals, such as chickens or cows are excluded. The species popular for by-products that include game meat are kudu, zebra, ostrich, warthog, blue wildebeest and springbok (Bekker, et al., 2011:345; Hoffman, 2007:4; van Hoving, 2011:2,24; van Zyl, 2018:3). Game meat can be enjoyed in many ways which include steaks, mince, biltong (cured or dry meat), sausage, droëwors (sausage made from meat that is dried), salami, smoked meat and chilli bites (van Zyl, 2018:9,12; Hoffman, 2007:4).

These meat products are either kept for own consumption, sold privately or in a retail establishment or exported (Neethling, 2016:8; van der Merwe & Zerbst, 2015; van der Merwe, 2012:19). Meat kept for own consumption remains on the game farm and is kept by the wildlife establishments' owner or manager, distributed to staff or sold to tourists that stay on the property (Taylor, *et al.*, 2016:40).

Game meat can also be sold - privately or to retail establishments. Retail establishments can include butcheries, retailers and wholesalers. The most popular outlets for customers to buy game meat are Spar and Checkers. Game meat sold in such retailers accounts for 20% of fresh red meat consumption (van Zyl, 2018:8-9). Legislation, poor customer perception and knowledge, taste, the trust of quality, animal diseases and the poor marketing of game meat prevent the consumption of game meat from increasing (Hoffman & Schutte, 2004:123-124; Neethling, 2016:8; van Zyl, 2018:16). To overcome this, the game meat retailer should offer instructions and recipes, provide specific details and increase availability, awareness and marketing (van Zyl, 2018:16;18). Increasing game meat consumption would be beneficial as the market is currently underdeveloped and the current demand for red meat exceeds the supply that is mostly provided by beef and lamb farmers (Cloete, 2015; Sojl, *et al.*, 2015:263).

Lastly, game meat can be exported. Legislation hinders certain private wildlife establishment operations and activities and this is discussed in chapter 3 (DAFF, 2010:5-6).

Any wildlife establishment that wishes to export game meat as part of a land-use form has additional factors to consider and apply as part of land-use. Exporting wildlife establishments must register themselves with the local authorities and the provincial veterinary authority to receive a registration number. The registration number allows the meat to be traced. During each step and process, the safety and hygiene of meat are monitored. The steps and process involves the shooting of the game species that should include a permit to prove that the hunt was legal, exsanguination, the transport to a field depot, the hanging of the carcass, evisceration, inspection and the transport to a registered abattoir for processing (McCrindle, *et al.*, 2013:3-4).

2.2.3.2 Animal skins

The second type of by-product is the skin of animals that provide leather products (National Department of Agriculture, Forestry and Fisheries, 2012:3-4). South African cultures use the skin as part of the traditional dress that forms part of rituals, symbolises importance, occupation (such as a farmer or hunter), personal worth, sex and marital and social status (Shava, 2015:9-11; Akinbileje, 2014:627-627). Non-traditional products from animal skins

are produced and sold on a small or large scale (Benson, 2014:17-18). Smaller scale examples are leather shoes, whips, handbags and other curios (National Department of Agriculture, Forestry and Fisheries, 2012:3-4). Animal skin, as well as bones and horns, may be used for other products not mentioned above. Large-scale industries obtain animal skins from abattoirs that are sold to other manufacturers to create mats, furniture, curios or car seats (Directorate Marketing, 2011:4). Such large-scale operations often export these products which involve legal considerations and veterinary permits (National Department of Agriculture, Forestry and Fisheries, 2012:3-4).

2.2.3.3 Bones and horns

The third type of by-product comes from bones and horns as well as nails, feathers and teeth (Child, 2012:1; Ferreira, *et al.*, 2013:89; Lindsey, *et al.*, 2012:20; Akinbileje, 2014:627-628). Bones, nails and horns are used for different reasons. The first are designer goods, such as jewellery or clothes. The second is to create wares which include furniture and other household items such as handcrafted bowls and cutlery. The third are souvenirs that can include ethnic Christmas decorations. Lastly, art products are produced that are either sold to tourists to represent a specific culture or produced for the local market that uses the by-products for traditional or cultural reasons (traditional art). Example of cultural art may be a painting of a person in traditional dress whereas an example of traditional art may be the painting of traditional huts (Jumbo Exports, 2017; Department of Arts and Culture, 1998:9). Traditional and cultural reasons involve using feathers, teeth and ivory to make bracelets, necklaces, and earrings. These, too, indicate sex, social and marital status as well as ethnicity (Shava, 2015:9-11; Akinbileje, 2014:627-628). In addition to horns being used for designer goods, wares and jewellery, certain horns, especially those of rhino, are exported illegally to Asia for medicinal purposes. The continuous illegal export is threatening the survival of the species (Department of Environmental Affairs, 2014:7).

2.2.3.4 Other uses

All of these products can also be used for medicinal purposes. The different by-products are obtained and prepared from different animals and different parts of the animals (Soewu, 2013:347). Examples of animals often used for medicinal purposes include roan antelope, leopard, rhino, African buffalo, duiker, bushbuck and lion. The parts of the animals that are used in medicinal by-products include bones, fat, limbs (tail, head and claws), skins, skulls, horns and intestines such as bladder and liver (Soewu, 2008:423-425). The different health care practices vary from conventional medicine to assisting with psychological and spiritual health (Soewu, 2013:347). Regarding conventional medicine, the World Health Organisation

recognises that many chemicals used in medicine originate from animals (Soewu, 2008:421). Other uses of animal by-products for medicinal purposes include medicinal usage amongst African cultures and traditional healers for traditional, religious and ceremonial reasons (Pietersen, 2014; Soewu, 2008:421). Examples of usage vary from treating bone fractures, tuberculosis, asthma and earaches (medicinal reasons) to the protection against evil, fulfilling wishes or seeking marital partners (traditional or ceremonial reasons) (Soewu, 2008:426; Mahawar & Jaroli, 2006).

Incorporating by-products as an individual land-use form is not necessarily viable. The reason is that sufficient natural resources to produce sufficient by-products on a small or large scale is sometimes difficult. Implementing by-products as a land-use form is more viable if combined with another land-use form as it can then generate additional revenue (Festa-Bianchet, 2012:12; Department of Arts and Culture, 1998:7,19-20). For example, selling curios and crafts can be combined with tourism since tourists are generally interested in such products (Department of Arts and Culture, 1998:16).

The last pillar that can be incorporated as part of a land-use form is game breeding and sales which are discussed next.

2.2.4 Pillar 4: Game breeding and sales

This pillar is divided into two categories, game breeding and game sales. The breeding or selling of game is indicated in the diagram below.

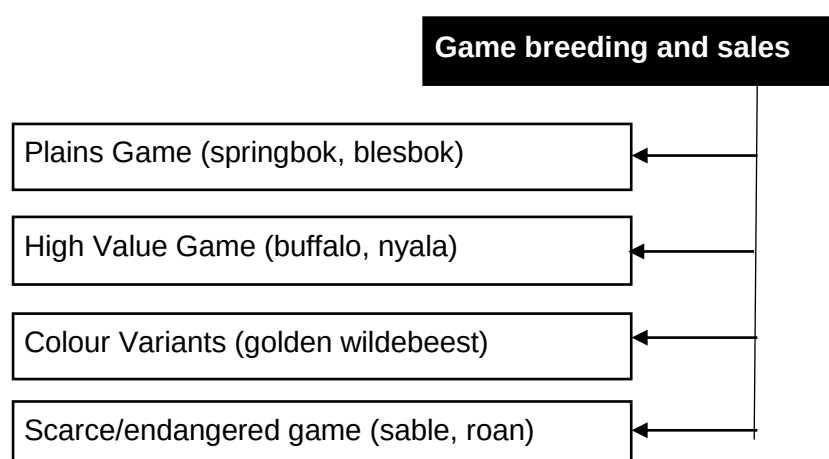


Figure 2.6: Categories of game breeding and sales

(Authors own creation) Sources used: van der Merwe, et al., 2010:105; Oldenbroek & van der Waaij, 2014:15, Taylor, et al., 2016:10-11

Game breeding and sales can involve plains game, high-value game, colour variants or scarce or endangered game. These are discussed next.

2.2.4.1 Game breeding

The first reason to breed is to satisfy various demands. The first demand stems from trophy hunters who demand trophy quality animals. The second stems from the demand for food and other by-products that originate from wildlife. A third demand stems from tourism activities that involve wildlife (Oldenbroek & van der Waaij, 2014:14; van der Merwe, *et al.*, 2010:105; Jonovsky, 2015:1). A second reason to incorporate game breeding into land-use is to prevent threats against wildlife. Such threats include habitat destruction and environmental changes and disasters (Leus, 2011:151). Wildlife breeders will consider the demands and threats to determine why breeding is necessary. The animals' qualities, genetics and family relations are then considered to determine whether intensive or extensive breeding should occur (Oldenbroek & van der Waaij, 2014:14). Intensive and extensive breeding is discussed next.

- *Intensive breeding*

Intensive breeding is also referred to as selective breeding (DEA, 2015) and aims to provide specific breeding conditions that allow specific animal traits to develop (DEA, 2015; Taylor, *et al.*, 2016:26). These traits cannot be guaranteed if there is natural breeding within a herd (DEA, 2015; Oldenbroek & van der Waaij, 2014:15). Examples of traits are specific skin colour, better genetics or horn length and species that are seen as high-value species or endangered (DEA, 2015; Taylor, *et al.*, 2016:27). High-value species are animals with high monetary value and which are seen as less common (Taylor, *et al.*, 2016: xi). Examples of high-value species are bontebok, buffalo, sable, tsessebe, nyala, roan and rhino (Taylor, *et al.*, 2016:xi; Coleman, 2015). Plains game includes non-predatory game. Examples are antelope, such as springbok, but exclude predators and rhino (Economists at Large, 2013:3, South Africa, 2009:4,6).

To help ensure that the required traits are developed, the animals bred are placed in fenced camps of various sizes (Fourie, 2008:53). The fences and camps protect the animals from diseases, parasites, predators and other animals that may dig underneath fences and harm the bred species (DEA, 2015; Fourie, 2008:52). Initially, such precautions were not necessary and extensive breeding (discussed below) provided an acceptable quality of the animal. However, the increase in demand for animals with specific traits for trophy purposes has increased. The animals are also of high value to owners and owners want to protect the game from diseases, predators and other threats. The increased demand led to intensive breeding that includes the above precautions as well as providing animals with food, water and veterinary services that are not necessary if animals live in their natural environment or are bred extensively (Taylor, *et al.*, 2016:26; van Hoving, 2011:12).

- *Extensive breeding*

Extensive breeding, also known as passive breeding involves less human or management interference than intensive breeding (Taylor, *et al.*, 2016:26-27). Extensively bred wildlife naturally migrate and select mates, breed and adapt to the natural environment (Oldenbroek & van der Waaij, 2014:16). Extensively operated farms involve animals that live in one large fenced area that more closely represents the natural environment and habitat where the animals occur (Oldenbroek & van der Waaij, 2014:16). The large areas have sufficient vegetation, water and other natural resources available that ensure that animals can survive on their own in a self-sustaining manner (van Hoving, 2011:12).

Managers of extensively operated breeding wildlife establishments place conservation as a high priority and offer an ideal setup to combine this land-use form with other land-use forms. Such as ecotourism, sales or hunting (van Hoving, 2011:12,20).

2.2.4.2 Game sales

Selling wildlife is done directly between wildlife owners or by using auctions (internet, catalogue or boma) (Musengezi, 2010:75; Taylor, *et al.*, 2016:10-11; van der Merwe & du Plessis, 2014:6; Wildswinkel, 2017; van Hoving, 2011:18). Auction sales occur through auction houses such as Wildswinkel, African Game Auctioneers and Mpatamacha (Wildswinkel, 2017; African Game Auctioneers, 2016; Mpatamacha, 2017). These auction houses organise numerous auctions throughout the year which are listed on their websites. The auction houses advertise game species on behalf of wildlife owners which include plains game, high-value game as well as rare and colour variant species. Together with auctioning, these auction houses are also knowledgeable about the capture, transport and translocation, insurance, prices and marketing of the species (Wildswinkel, 2017; African Game Auctioneers, 2016).

This section discussed the four pillars that can be used individually or in combination to create land-use forms. The next section focuses on mixed farming that can be included as part of land-use.

2.3 MIXED FARMING

Additional types of farming practice can also be incorporated as activities in combination with wildlife. These are crop farming, stock farming and poultry farming. Crop farming refers to farming practices that include growing vegetables, fruit, maize and sunflower. Livestock (stock) farming includes farming with cattle, sheep or goats (Statistics South Africa, 2012:4-5). Poultry farming involves farming with chickens, geese, turkey and ducks (Glos, 2011:vii).

These farmers, that combine crop, stock or poultry farming with 'game farming' apply mixed farming either in conjunction with each other or with the aim of one type of farming eventually replacing another type of farming (Lindsey, *et al.*, 2013a:1-2).

There are three reasons why some wildlife establishments choose to combine different types of farming practices. These three reasons are viability, climate change and food security which are discussed next (Taylor & van Rooyen, 2016:1; Otieno & Muchapondwa, 2016:1-2; van der Merwe & du Plessis, 2014:37).

2.3.1 Viability

The first reason is the viability of wildlife establishments (Taylor & van Rooyen, 2016:1). When the costs and benefits of wildlife establishments and livestock farming are compared, research has shown that livestock farming, especially as an individual farming practice, is less ideal over the long haul than a pure wildlife establishment or even when stock farming is mixed with wildlife (Cholo, *et al.*, 2016:407-431). Reasons are revenues that are generally higher for wildlife establishments than for livestock farming and general conservation regarding natural habitats (Lindsey, *et al.*, 2013b:42; Otieno & Muchapondwa, 2016:1-2).

2.3.2 Climate change

The second reason to convert agricultural land into private wildlife establishments or incorporate mixed farming as part of land-use, and eventually probably just owning wildlife, is because of climate change (Otieno & Muchapondwa, 2016:1-2; Tibesigwa, 2014; Cholo, *et al.*, 2016:431). Research indicated that mixed farming practices, especially wildlife-livestock farming, will be impacted less by climate change in future and even more so if land-use forms just focus on wildlife (Otieno & Muchapondwa, 2016:1-2). The reason is that wildlife is better able to sustain droughts and move naturally to areas where water and rain occur than livestock which does not naturally migrate to areas where rain or natural water occur (Lindsey, *et al.*, 2013b:42; van der Merwe & du Plessis, 2014:37).

2.3.3 Food security

A third reason is that wildlife will play an important role in food security. Currently livestock is kept because it is a source of food and protein (van der Merwe & du Plessis, 2014:37; Meissner, *et al.*, 2013:282). This scenario is set to change in future as wildlife can graze on the same land that livestock with less environmental damage. The overall aim is to produce large quantities of meat protein. Thus, considering that it is estimated that wildlife will become a better source of meat protein than livestock in future, it may be worthwhile to

implement mixed farming and incorporate wildlife into the land-use form (Otieno & Muchapondwa, 2016:1-2; Lindsey, *et al.*, 2013b:42; Cholo, *et al.*, 2016:431).

Depending on the combination of crop, stock or 'game' farming, these three reasons for implementing mixed farming practices involve additional considerations. These considerations include fencing requirements, which are different for wildlife and stock or crop farms, and different means of providing water for wildlife and livestock or crops. In certain circumstances, certain infrastructure must be removed if wildlife is kept on what used to be an area where livestock was kept (for example kraals) or new infrastructure may be necessary, such as tourist roads or hunting camps (van der Merwe & du Plessis, 2014:36). These and other infrastructure considerations for land-use are discussed next.

2.4 INFRASTRUCTURAL REQUIREMENTS

Each of the land-use pillars options discussed require different infrastructure development. Table 2.1 below summarises the infrastructure considerations based on the four land-use pillars identified earlier in the chapter. After the table, the different infrastructural development options, and why the infrastructure is necessary for effective land-use, are discussed.

Table 2.1: Land-use pillar infrastructure

		Land-use			
		Tourism	Hunting	By-products	Breeding & Sales
Fence infrastructure	Game fences	Yes, depending on animal species kept.	Yes, depending on animal species kept.	Yes, depending on animal species kept.	Yes, depending on animal species kept.
	Fences subdividing areas on a property or around infrastructure	Yes. Surround accommodation and other smaller areas that require fencing.	Only if there are smaller areas where hunting does not take place.	Only if there are areas where fencing is needed.	Yes. To surround intensive camps to protect species.
Water infrastructure	Natural	Preferable	Preferable	Preferable	Preferable
	Artificial	Optional. If not enough natural water is available	Optional. If not enough natural water is available	Optional. If not enough natural water is available	Optional. If not enough natural water is available

		Land-use			
		Tourism	Hunting	By-products	Breeding & Sales
Road infrastructure	Tourist roads	Yes	No	No	No
	Firebreak roads and areas	Yes	Yes	Yes	Yes
	Hunting roads	No	Yes. Management and firebreak roads can be used. Additional roads may be necessary.	Maybe if hunt to obtain raw materials for by-products	No
	Management roads	Yes	Yes	Yes	Yes
Staff-specific infrastructure	Staff Housing	Yes	Yes	Yes	Yes
	Offices	Yes	Yes	Yes	Yes
	Kitchen for restaurant	Yes, if it is not self-catering	Yes, if it is not self-catering	No	No
	Staff kitchen and canteen	Yes.	Maybe, depending on some staff.	Maybe, depending on some employees and Land-use activities	Maybe, depending on some employees and Land-use activities
	Housekeeping facilities/area	Yes, if have tourist accommodation	Yes, if offer accommodation for hunters	No	No
	Areas used for veterinary purposes	Maybe, if have veterinary services on property	Maybe, if have veterinary services on property	Maybe, if have veterinary services on property	Maybe, if have veterinary services on property
	Lockable storage or warehouse areas	Yes	Yes	Yes	Yes
	Tourist Accommodation and facilities	Yes, for wildlife tourists.	Yes, for hunting tourists	No	No

		Land-use			
		Tourism	Hunting	By-products	Breeding & Sales
Hunting-related infrastructure	Abattoir or butchery	Yes, if own meat is processed and used on the farm.	Yes, depending on market	Yes	No
	Trophy room	No	Yes	No	No
	Trophy handling shelter	No	Yes	No	No
	Cold-room	Yes, food storage	Yes to store hunted game.	Yes to store hunted game used for by-products.	No
Other	Holding pens, hides and bomas	Yes, depending on management.	Yes, depending on management.	Yes, depending on management.	Yes, depending on management.

(Author's own creation) Sources used: Lindsey, et al., 2011b:215; Mwakiwa, et al., 2013:253; Bothma and du Toit, 2016:152; van der Merwe and du Plessis, 2013:126-128; Paulsen, et al., 2011:52

The infrastructure listed in Table 2.1 has been divided into categories which are fences, water, roads, staff-related infrastructure, tourist-related infrastructure and hunting-related infrastructure. These infrastructures relate to one or more land-use pillars and, in certain cases, the infrastructure is optional and can be used to a greater or lesser extent depending on how the land-use form is implemented. Each of these categories has been further subdivided and will be discussed below.

2.4.1 Fences

Fencing infrastructure can be divided into game fences or fences that subdivide smaller areas on a property. These fences have different specifications such as height and whether or not the fence should be electrified. The fencing specifications will depend on provincial legislation, and species kept on the wildlife establishment which are discussed in chapter 3. Game fences are needed by all four land-use forms as the fences indicate ownership and user rights on a specific piece of land (Hanophy, 2009:2; Lindsey, et al., 2011b:215; South Africa, 1991:1-3).

Fences for smaller camps are mostly used by land-use forms that include tourism and breeding and game sales. For tourism, fences may be needed to surround accommodation.

The reason to prevent wild animals from entering the accommodation or tourists entering areas where wildlife occurs (Ferguson & Hanks, 2018:51; van der Merwe & du Plessis, 2014:51). Land-use forms that include intensive breeding require fences that surround camps. These camps protect the investment of highly endangered or high-value species on which land-use forms depend (Ferguson & Hanks, 2018:2,4). For these two land-use forms, hunting and by-products, there may be other reasons to fence off smaller areas. An example is to protect the natural environment within a specific area from degradation or erosion or to surround staff accommodation (Beck, 2008:15-19; Ferguson & Hanks, 2018:49; van der Merwe & du Plessis, 2014:51).

2.4.2 Water-related infrastructure development

Water-related infrastructure is divided into two categories; these are natural water sources and artificial water sources which require human-made infrastructure. Quality water, whether from natural or artificial sources, is needed by both animals and humans for all four land-use forms. Wildlife need water to drink and survive and all the land-use forms are dependent on the existence of wildlife. The waterholes on which wildlife depend for water are also ideal locations for tourists since tourists prefer to watch wildlife at water holes (Mwakiwa, *et al.*, 2013:253). In addition, humans (staff and tourists) that stay in accommodation, or are on the property during the day for work or visits, will be dependent on a reliable supply of quality water (Mwakiwa, *et al.*, 2013:253; Simpson, *et al.*, 2011:190,195; van der Merwe & du Plessis, 2014:55).

Sources of natural water require less maintenance than artificial water sources and include lakes, pans, rivers, streams and weirs (van der Merwe & du Plessis, 2014:58,130-145). These natural sources of water are preferred by certain species such as the roan antelope, gemsbok, sable and springbok (Bothma & du Toit, 2016:134,137; Mwakiwa, *et al.*, 2013:253; Simpson, *et al.*, 2011:191;). Artificial water is stored or harvested from rainwater through the ground or roofs and stored in reservoirs, dams, waterholes or troughs. Certain species, such as buffalo and zebra, prefer artificial water over natural water sources (Bothma & du Toit, 2016:131; Mwakiwa, *et al.*, 2013:253; Rosenstock, *et al.*, 1999:302). It is suggested that artificial water is made available on various parts of a wildlife establishment, especially wildlife establishments that do not include camps. Having numerous water points can encourage animals to migrate and tourists to travel to additional water sources which reduces the impact on the natural environment around waterholes (Fourie, 2011:2; Mwakiwa, *et al.*, 2013:253; Rosenstock, *et.al.*, 1999:303; Simpson, *et al.*, 2011:191, 193;). For game species that are kept in various camps on a wildlife establishment, such as for

breeding purposes, artificial water will need to be provided if camps do not have natural sources of water (Taylor, 2016:1-2).

2.4.3 Road-infrastructure

Road infrastructure can be divided into four categories, tourist roads, firebreak roads, hunting roads and management roads (Bothma & du Toit 2016:152; Fourie, 2011:3). In most instances, all land-use forms use the same roads, except for tourism that needs additional roads for tourists to view the game.

Tourist roads only need to be built if the land-use form incorporates wildlife tourism. Tourist roads are built to curve through different types of vegetation and pass waterholes so that tourists can observe nature and animals in private vehicles or on game vehicles owned by the game farm (Bothma & du Toit, 2016:152; Fourie, 2011:3). Tourists want to observe and experience animals in their natural habitat. Some species are easier to find because of their size while others are more difficult (Tapper, 2006:12-15). To allow tourists to view the different species in different habitats, roads should be planned so that there is little impact on the environment, yet still allow tourists to access the entire area to possibly view all wildlife species (Tapper, 2006:12-15; van der Merwe & du Plessis, 2014:42).

Firebreak roads are needed for all land-use forms and have three purposes. These purposes are to prevent or stop wildfires, to offer a line or area to combat wildfires and to protect property (DAFF, nd.; Trollope, 2015). Firebreak roads should be at least 8 metres wide and can be made of clayey soil, loam soil, gravel or stones (Bothma & du Toit, 2016:152; van der Merwe & du Plessis, 2014:61). Firebreak roads are also used as hunting or management roads (Bothma & du Toit, 2016:152; van der Merwe & du Plessis, 2014:60). Management and hunting roads involve disturbing the veld as little as possible. The main aim, concerning hunters, is to conveniently link hunters or game capturers with the game and the skinning facilities. This applies to land-use forms where the animals are shot for trophy, meat or by-product purposes (Bothma & du Toit, 2016:152).

2.4.4 Staff-related infrastructure

Staff can include managers, field rangers, general labourers, mechanics, veterinarians and general labourers (Dry, 2015). The staff-specific infrastructure built depends on land-use forms. These staff will need offices for administrative purposes and bathrooms. In any instance where staff stay on a wildlife establishment property, staff accommodation is needed. Staff accommodation can either be individual units or a communal building (Bothma & du Toit, 2016:169). If tourism is incorporated, staff-only buildings may also include a reception area to welcome guests, housekeeping area, kitchen facilities and maybe

infrastructure that allow events to be held (Tourism Grading Council of South Africa, 2014:29-30,32; van der Merwe & du Plessis, 2014:126-128).

The reason for infrastructure for housekeeping purposes should include a laundromat and storage areas to wash, store and distribute housekeeping equipment, such as linen and toiletries (Ransley & Ingram, 2004:14-16). Kitchen areas for staff, overnight and function guests, must be on site and should include a storage area for food and beverages and kitchen equipment which will allow staff to serve food and beverages to guests. If events are held, function rooms of various sizes should also be built. Function rooms should allow for storage areas for, for example, furniture (Ransley & Ingram, 2004:14-16). Lockable storage or warehouses can also be used for maintenance work or storing equipment or fuel (Bothma & du Toit, 2016:169).

2.4.5 Tourist accommodation and facilities

Tourist accommodation and related infrastructure should be considered for wildlife tourism which includes ecotourists and hunting tourist (van der Merwe & du Plessis, 2014:126-128). The design will vary depending on factors such as the location of the wildlife establishment together with the type of visitor and length of stay (van der Merwe & du Plessis, 2014:127). The quality and type of accommodation also plays a role and is regulated by guidelines of the Tourism Grading Council of South Africa. This accommodation can vary from camping to lodges with different star-grading and facilities (Tourism Grading Council of South Africa, 2014; van der Merwe & du Plessis, 2014:14,121).

As part of an accommodation product, additional recreational activities can be offered to overnight or day travellers (Meeras, 2010:8). Examples of additional infrastructures are sufficient parking facilities for guests and staff; restaurant and bar areas where guests can enjoy meals, public lounges for relaxation and public restroom facilities near any public areas (Bothma & du Toit, 2016:169; Tourism Grading Council of South Africa, 2014:210). Additional recreation facilities can be built and provided as an add-on product. Examples are fenced-off picnic areas, tennis courts, a gym and wellness centre, souvenir or curio shops or entertainment areas (Tourism Grading Council of South Africa, 2014:210). The additional products can be provided free of charge or with the aim of providing an additional income stream (Costa, *et al.*, 2007:117; Meeras, 2010:8). Another way to gain an additional stream of income is to host events or functions such as conferences, exhibitions or weddings (SiteMinder, 2018). If events are held, function rooms of various sizes should also be built which should include lobby areas, cloakroom facilities, restrooms and equipment (Ransley & Ingram, 2004:14-16). Such infrastructure, which relates to events, should also be near kitchen facilities so that food and beverages can be served as needed (SiteMinder, 2018).

2.4.6 Hunting-related infrastructure

Accommodation for hunters can involve the same infrastructure considerations as for ecotourism. It is important that hunters and ecotourists must never be accommodated at the same time at the same place. They must be kept separate. However, there is additional infrastructure that should be built. These include abattoirs or butcheries and trophy rooms, cold-rooms, shooting ranch and a trophy handling shelter.

The abattoir-related infrastructure will depend on whether meat will be used for own consumption, sold to retailers or exported. If on-farm abattoirs are used to sell to retailers, the abattoir must conform to regulations as stipulated in the Meat Safety Act (40 of 2000) and the general hygiene requirements for food premises as per the National Health Act (61 of 2003) (Paulsen, *et al.*, 2011:52). Such on-farm abattoirs should be equipped with a fridge and freezer to ensure an acceptable quality of meat and to prevent diseases (Paulsen, *et al.*, 2011:59). Off-farm abattoirs are governed by specific regulations, such as meat inspections. On-farm abattoirs are exempted from such regulations as carcasses are slaughtered for own consumption (Paulsen, *et al.*, 2011:52).

Trophy rooms, generally close to a butchery or abattoir, are used to store the trophy animals that were shot. Trophy-handling shelters are necessary to store the horns, skull and hides and clean and remove the intestines, head and feet from the animals (Bothma & du Toit, 2016:163-169). Game hunted should be put in cold storage as soon as possible to prevent bacteria from growing and prevent the meat from spoiling (van Schalkwyk & Hoffman, 2010:59-60). The temperature of the cold rooms should ideally be between zero to 4°C to ensure good quality meat (van der Merwe, 2012:43). Cold rooms are therefore used for hunting and by-product land-use forms where the feet, hides and horns are used for other purposes than trophies.

2.4.7 Other infrastructure

Breeding, especially intensive breeding, will require camps constructed of fences discussed earlier. Also, bomas and holding pens may need to be constructed (Bothma & du Toit, 2016:174; Walker, 1992:40). The guidelines for bomas, hides and holding pens are species-specific and should also be constructed away from fences and close to the loading area (Bothma & van Rooyen, 2017; Fourie, 2011:3; Walker, 1992:41). The reasons for constructing bomas and holding pens on wildlife establishments are to capture game and transport animals for live sales, keep animals in quarantine and to hold animals while they get used to their new environment. These scenarios may apply to any land-use form options but are most prevalent where the land-use form considerations involve the translocation of

game for live sales. Such bomas should allow sufficient water, food and space for movement (Bothma & du Toit, 2016:174; Walker, 1992:40).

Also, hides and lookout points/towers may be constructed. Although mostly used for tourism purposes, they can also be used for hunting and breeding, depending on how the land-use form is implemented. The type of wildlife tourism activity will impact decisions on hiding or lookout characteristics. For example, if bird watching is to be incorporated into a land-use form, then investment in a bird hide might be made. Hides are generally located at waterholes, blend in with the environment and avoid direct sunlight (Bothma & du Toit, 2016:171). Bird or wildlife watching hides can be permanent wooden structures that take the form of a cabin or a temporary mobile tent. Such hides allow the view of wildlife without wildlife being disturbed; increase the safety of guests concerning predator species and should be designed to have minimal impact on the environment (Rewilding Europe, 2012:3-5).

2.5 CONCLUSION

The primary aim of this chapter was to analyse the private wildlife industry. The discussion focuses on four different pillars, wildlife tourism, hunting, by-products and game sales and breeding that can be combined into different land-use forms. The secondary aims were twofold. The first was to discuss mixed farming where stock and crop farming are carried out in conjunction with 'wildlife' farming. The second was to discuss the infrastructure considerations for private wildlife establishments and the pillars to which they are most applicable. The next chapter focuses on legislation that impacts the private wildlife industry.

CHAPTER 3

LEGISLATION IMPACTING ON THE PRIVATE WILDLIFE INDUSTRY IN SOUTH AFRICA

3.1 INTRODUCTION

In the previous chapter, the four pillars of the private wildlife industry were discussed as they can be implemented into land-use. The legal definition of land-use mentions the legal use of land as authorised by government while a land-use management system involves the regulating and managing of land-use through legislative schemes, procedures and developments (South Africa, 2013b:7). Decisions that relate to these pillars are guided by provincial and national legislation that is discussed in this chapter. This chapter is divided into six sections. The sections are indicated in the figure below.

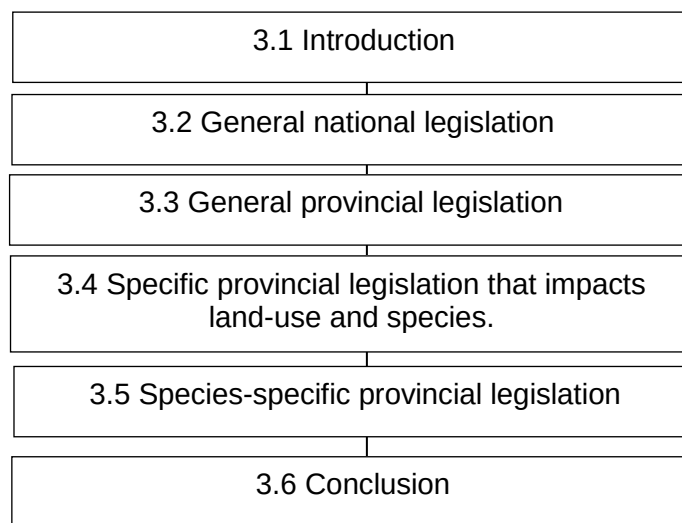


Figure 3.1: Chapter layout

The aim of this chapter is not to summarise all existing legislation. Such legislation is different for each province in South Africa. This chapter consists of a list of the national legislation that impacts the private wildlife industry. Next, it discusses provincial environmental legislation and the main differences that are implemented per province and which impact the private wildlife industry. It also focuses on legislation that relates to specific species.

3.2 GENERAL NATIONAL LEGISLATION

Literature was researched and it was found that national legislation can be divided into five categories that directly or indirectly impact private wildlife establishments. The table below offers a summary of the national legislation and the five categories.

Table 3.1: General national legislation

General National Legislation	Land affairs	• Provision of Land and Assistance Act (126 of 1993) • Interim Protection of Informal Land Rights Act (31 of 1996) • Extension of Security of Tenure Act (62 of 1997) • Upgrading of Land Tenure Act (112 of 1993) • Spatial Planning and Land-use Management Act (16 of 2013) • Property Valuation Act (17 of 2014) • Expropriation Act (63 of 1975) • Communal Property Associations Act (29 of 1996) • Expropriation Bill and Land Commission Bill. (2018) • Subdivision of Agricultural Land Act (70 of 1970) • Development and Protection of Agricultural Land Bill (2017)
	Employees in workplace	• Skills Development Act (97 of 1998) • Basic Conditions of Employment Act (75 of 1997) • Employment Tax Incentive Act (26 of 2013) • Labour Relations Act (66 of 1995) • Employment Equity Act (55 of 1998) • Occupational Health and Safety Act (85 of 1993)
	Animal health	• Medicines and Related Substances Act (101 of 1965) • Veterinary and Para-Veterinary Professions Act (19 of 1982) • Fencing Act (31 of 1963) • Animal Diseases Act (35 of 1984)
	Agriculture related	• Animal Health Act (7 of 2002) • Animal Identification Act (6 of 2002) • Animal Protection Act (71 of 1962) • Conservation of Agricultural Resources Act (43 of 1983) • Disaster Management Act (57 of 2002) • Firearms Control Act (60 of 2000) • Game Theft Act (105 of 1991) • Marketing of Agricultural Products Act (47 of 1996) • Meat Safety Act (40 of 2000) • National Water Act (36 of 1998) • South African Abattoir Corporation Act (120 of 1992) • Animal Improvement Act (62 of 1998)

	Natural environment	• National Environment Act (107 of 1998) • National Environmental Management: Protected Areas Act (57 of 2003) • National Environmental Management Biodiversity Act (10 of 2004) • Draft National Environmental Management Biodiversity Bill (Gazetted 16 Feb 2018) • Draft Amendments to Alien and Invasive Species Regulations (2018) • Mountain Catchment Areas Act (63 of 1970) • National Forests Act (84 of 1998) • World Heritage Convention Act (49 of 1999)

Source: Dry, 2016

The five categories are land affairs, employees, the natural environment, animal health and agriculture related legislation (Dry, 2016). The first category is land affairs and relates to the usage and development of land in general, not just in terms of wildlife establishments. The second category relates to employees within any workplace that includes staff working on wildlife establishments. The third category relates to animal health that includes wildlife. The fourth category refers to agricultural land and that combines legislation as it relates to wild animals and taking care of animals on a piece of land. The last category refers to the natural environment and is more directly applicable to privately owned farmed wildlife establishments. Some of the Acts listed, like the National Environmental Management Acts are the basis on which provincial legislation is developed. Such provincial legislation is discussed in the rest of this chapter.

The wildlife jurisprudence in a province will influence the land-use for farmed game on privately owned agricultural land.

3.3 GENERAL PROVINCIAL LEGISLATION

The main provincial environmental legislation for each province is listed in Table 3.2.

Table 3.2: Provincial Environmental Legislation

Province	Legislation Description	Number and Date
Western Cape	WC Nature Conservation Amended Act	3 of 2000
Eastern Cape	Ciskei Nature Conservation Act	10 of 1987
	Transkei Environmental Conservation Decree	9 of 1992
	Nature Conservation Ordinance (Old Cape of Good Hope area - excluding Transkei and Ciskei)	19 of 1974
North West	NW Biodiversity Conservation Bill	2015
Free State	Nature Conservation Ordinance	8 of 1969
KwaZulu-Natal	KZN Nature Conservation Act Amendment	5 of 1999 (was 9 of 1997)
	KZN Nature Conservation Act	9 of 1997
Mpumalanga	MP Nature Conservation Act	10 of 1998
Limpopo	Lim Environment Management Act	7 of 2003
Gauteng	Draft Nature Conservation Bill	2014
Northern Cape	Nature Conservation Act	9 of 2009

Source: *Center for Environmental Rights, 2018*

Table 3.2 summarises the provincial environmental legislation used in this chapter. The Western Cape province, Ciskei area in the Eastern Cape province, KwaZulu-Natal province, Mpumalanga, Limpopo and the Northern Cape provinces have existing Acts that can be amended or replaced. An example is the KwaZulu-Natal Amended Act. The North West province and the Gauteng province have Bills which will become Acts once implemented. The Free State province has had an ordinance since 1969. There may be a new Free State bill, but that is not included in this chapter.

The dates of these Acts vary from 1969 and 1974 to 2015. Although old, the definitions and information are still applicable if no additional proclamations, such as those discussed later in this chapter, are brought out. All the Acts, Bills or Ordinances above lay out regulations in terms of government, hunting, permits, game capture, illegal activities, game sales etc. These are all linked to land-use and the pillars discussed in the previous chapter. There are minor differences. For example, the definitions indicated in the first part of provincial environmental legislation. Not all provincial environmental legislation has all definitions. For

example all provinces, with the exception of the KwaZulu-Natal, North West and Gauteng provinces give the same definition of 'Adequately Enclosed'. The order, chapters and detail provided of legislation may differ between different provinces but, overall, the provincial environmental legislation is made up of these themes which are linked to the NEMBA Act. More distinctive differences occur in the way animals are classified in different provincial legislation, provincial hunting regulations and the geographical area of certain species.

Differences in animal classification and hunting legislation are discussed below. Separate hunting legislation and the way animal species are classified within this legislation varies and is issued by each provincial government every year. This is discussed next.

3.3.1 Western Cape province species classification and hunting protocol

The Western Cape Nature Conservation Laws Amendment Act (3 of 2000) summarises the environmental legislation of the province which is in accordance with national legislation. Animals are listed as protected species or endangered wild animals and legislation that relates to specific species is elaborated upon in separate legislation described later in the chapter (Western Cape, 2000:88-96).

The Western Cape province specifies hunting regulations and hunting seasons that are specific to certain municipal areas and times of year. For example, grysbok and impala can be hunted throughout the province from 1 January to 31 December, but kudu may only be hunted from 1 May to 31 August or from 1 January to 31 December depending on the geographical area. The Western Cape province is the only province that elaborates on conditions under which bow hunting can take place which, in national and the provincial legislation, is listed as a restricted activity (Western Cape (South Africa), 2015:2390-2391). The hunting regulations also specify bag limits that vary per species. For example, an unlimited number of blue and black wildebeest can be hunted, but only one bushbuck and eland may be hunted (Western Cape (South Africa), 2015:2390-2391).

Additional legislation is compiled by Cape Nature which is the public institution that, according to Western Cape Nature Conservation board Act (15 of 1998), research and compile policies on wildlife for the province (CapeNature, 2016). Examples are species and land-use related legislation such as policies and guidelines on bontebok, game translocation and utilisation and the fencing and game enclosure policy (Western Cape Nature Conservation Board (South Africa), 2015, 2014 & 2010).

3.3.2 Eastern Cape province species classification and hunting protocol

The Eastern Cape province has three areas and three different sets of legislation must be considered in each of these areas. The first is the Republic of Transkei's Environmental Decree (9 of 1992), the second is the Republic of Ciskei that has a Nature Conservation act of 1987 and the third is the rest of the province that has a Nature Conservation Ordinance (19 of 1974). Each of these sets of legislation highlight regulations that guide the protection of fauna and flora (Cape of Good Hope (South Africa), 1975:1-148; Ciskei (South Africa), 1987; Transkei (South Africa), 1992).

In addition, annual hunting regulations are issued for each separate area in one gazette. The hunting regulations for areas that exclude the Ciskei and Transkei list the species that can be hunted, the time of year hunting can take place, bag limits and specific legislative conditions under which hunting can take place. There are also special regulations that relate to kudu which are not mentioned in other provinces' legislation. Ciskei hunting regulations lists certain species – mostly small animals. To hunt other animals permissions and permits are necessary. In the Transkei there are no hunting seasons and no species listed. Permits are necessary to hunt any species (Eastern Cape (South Africa), 2016:9-20).

In addition, the Eastern Cape has an Operational Policy Guideline for bontebok to prevent hybridisation of the bontebok and blesbok (Chief Directorate, nd:1-6)

3.3.3 North West province species classification and hunting protocol

The North West Biodiversity Bill (2015) and Biodiversity Management Act stipulates environmental considerations for the province and classifies animals either as specially protected species or ordinary species. Ordinary species must be hunted with the landowner's written consent and certain ordinary species must be noted on the prescribed movement register when captured or transported. Protected game needs a permit (North West (South Africa, 2016b: 58-66).

The North West province's hunting regulations mentions that free-roaming species may be hunted between 1 May to 31 July and game found on fenced game farms hunted throughout the year. Such hunting protocols may change. All hunters must apply for a hunting licence before the hunt occurs and report the hunt to the correct government authority. The hunting proclamation includes the list of animals that are allowed to be hunted and the cost of hunting that animal. In addition, the costs associated with processing TOPS (Threatened or Protected Species) are listed together with the costs associated with the transport of animals, CITES, the import and export of plains game trophies and farms that want to be

declared exempted. Lastly, the proclamation includes the hunting report for non-exempted farms and the contact details of the different municipalities within the province where licences can be obtained (North West (South Africa), 2016a:4-15).

In addition to general environmental and hunting legislation, the North West province has guidelines for the fencing of wildlife establishments with specific species and wildlife establishments that keep predators (North West (South Africa), 2010; North West (South Africa), 2013)

3.3.4 Free State province species classification and hunting protocol

The Nature Conservation Ordinance (8 of 1969) stipulates environmental legislation for the province and classifies animals as protected game, ordinary game, specified wild animals and animals that may be hunted at night (Free State (South Africa), 1969:20-26). The Provincial Gazette that indicated hunting seasons in 2014 was still applicable in 2016 and classifies animals as ordinary game and TOPS species. Hunting seasons vary depending on whether or not the property has a fencing certificate. If the property has a fencing certificate to prove that the fences are as specified in the Game Theft Act (105 of 1991) the hunting seasons for ordinary game (gemsbok, grey duiker and grey rhebok) are from 1 January until 31 December, with certain exceptions. If no fencing certificate is obtained, hunting seasons are shortened from 1 April to 30 September, depending on the species being hunted. The hunting regulations also specify which animals may not be hunted at night and the times of the year when animals may be captured – mostly from 1 March to 31 October (Free State (South Africa), 2014:3-7).

Additional legislation that impacts wildlife establishments and land-use are the Free State provincial gazette that indicates norms and standards for the management of bontebok; large predators and black rhino (Free State (South Africa), 2013).

3.3.5 KwaZulu-Natal province species classification and hunting protocol

The KwaZulu-Natal Nature Conservation Management Act (5 of 1999) guides environmental legislation and only mentions protected indigenous animals and specially protected indigenous animals (KwaZulu-Natal (South Africa), 1999:39-42). The hunting regulations published in 2015 mention protected game, TOPS species, specially protected game and open game (KwaZulu-Natal (South Africa), 2015:1-4). The classification indicates which permit or licence is necessary and is also dependent on whether or not the hunter hunts on land of which he is the owner. Hunting seasons and bag limits are given in legislation (KwaZulu-Natal (South Africa), 2015:1-4).

Additional regulations are given for black and blue wildebeest by the KZN Nature Conservation Board which aims to prevent hybridisation (KZN Wildlife, nd:1-4).

3.3.6 Limpopo province species classification and hunting protocol

The Limpopo Environmental Management Act (7 of 2003) stipulates environmental legislation for the province and classifies animals as protected wild animals, specially protected wild animals, non-indigenous wild animals and game (Limpopo (South Africa), 2003:3-6). Most animals classified as 'game' in the Limpopo Environmental Management Act (7 of 2003) are classified as mammals in the hunting regulations and may be hunted either from 1 May to 30 April or from 1 May to 31 July. Limpopo province's hunting regulations also distinguish between landowners who hunt on their own land and those that hunt on land of which they are not the owner. The hunting proclamation lists the species, the open hunting seasons and the closed districts and farms on which hunting is prohibited (Limpopo (South Africa), 2003:3-6).

Other information states that hunters of specially protected animals must be in possession of a permit. Protected animals also require a permit except when the landowner is in possession of an exemption permit. Any person hunting on such an exempted farm must obtain written permission that allows them to hunt animals on the exempted farm. In open season, the owner can hunt without a permit as long as it is during the day. The same applies to family with the exception that family must obtain permission from the owner. During closed season, the owner and family must obtain a permit to hunt if it is not an exempted farm. For any hunter that is not the owner or family member the hunters, unless the hunt takes place on an exempted farm, require permits for specially protected and protected species. During open seasons the hunter needs a hunting licence and written permission from the landowner. During closed season the hunter must obtain a special permit. Hunting on an exempted farm required only written permission of the owner (Limpopo (South Africa), 2003:45-48; Uys, 2016; Wildlife Trade & Regulation, nd.).

On non-exempted game farms, all nature conservation ordinances and other environmental legislation apply to land-use. This is not the case on exempted game farms that have an Adequate Enclosing Permit which allows activities such as hunting out of season or hunting certain species without a permit on a game farm. In general, the exempted farm owner will issue the hunter with a permit that indicates that the hunt is allowed and that meat can be transported. In the Limpopo province, exempted farms may not need to issue hunting licences but, if hunters want to remove the carcass during the hunting season, a carcass

removal permit is necessary. A transport permit is necessary if animals are transported into and out of areas where swine fever occur (Uys, 2016).

3.3.7 Mpumalanga province species classification and hunting protocol

Mpumalanga's Nature Conservation Act (10 of 1998) stipulates environmental legislation and classifies animals as protected wild animals, specially protected animals, protected game and ordinary game (Mpumalanga (South Africa), 1998:7-9) while the Mpumalanga province hunting regulations only lists ordinary game. The open hunting season is from 1 May to 30 April the following year for certain species (blesbok, blue wildebeest and springbok) or from 1 May to 31 July for other species (bushbuck, impala and kudu). Bag limits are not indicated on the hunting regulations and regulations may vary depending on whether you are a landowner or not hunting, and each species has geographical information that further indicates where the species may be hunted (Mpumalanga (South Africa), 2017:16-21).

3.3.8 Gauteng province species classification and hunting protocol

The Transvaal Nature Conservation Ordinance (12 of 1983) regulates environmental legislation and classifies animals as protected wild animals, specially protected game, protected game and problem animals (Gauteng (South Africa), 1983:35-42). The Gauteng Nature Conservation Bill will replace the Conservation Ordinance once approved (Gauteng (South Africa), 2014). The Gauteng province Hunting Regulations do not list any species applicable to this study and mostly focus on birds (Gauteng (South Africa), 2015:4-7).

3.3.9 Northern Cape province species classification and hunting protocol

The Northern Cape Nature Conservation Act (9 of 2009) stipulates environmental legislation for the province (Northern Cape (South Africa), 2009:1-92). Recent hunting publications do not give a list that classifies animals, but indicate open seasons for hunting, bag limits and additional information. The hunting proclamation mentions illegal hunting methods similar to those set out in national legislation but states that, unless indicated otherwise in the hunting proclamation, such hunting methods may be used. The hunting proclamation mentions the species that may be hunted and varies in terms of the time of year that animals can be hunted, the bag limit per person per day and the types of hunting methods that may or may not be used (Northern Cape (South Africa), 2012:5-9).

The discussion above highlights differences in hunting legislation. It should be kept in mind that provincial hunting legislation changes annually and that the same species doesn't necessarily occur every time. In general, there are hunting seasons and bag limits. In some

provincial legislation, the seasons and bag limits are specifically mentioned. In other legislation, especially if the animal is protected, permits are necessary. The section below shows in more detail province-specific hunting legislation and hunting considerations as well as other province-specific legislation that relate to specific species

3.4 SPECIFIC PROVINCIAL LEGISLATION THAT IMPACTS LAND-USE AND SPECIES

In addition to the general provincial legislation discussed previously that differs between provinces, provincial governments have also issued additional provincial legislation for specific species. The laws are based on provincial environmental laws, but had to be changed to ensure the survival of certain species.

The nine different provinces each have their own environmental legislation that aims to conserve the natural environment. Upon researching provincial legislation, it became apparent that provincial legislation incorporates three aspects. The first aspect is the individual nine provinces that have province-specific legislation. The second is specific species that are mentioned in certain provinces' legislation and which have specific legislation allocated to ensure conservation and sustainability. The third is five predominant categories in which provincial sets of legislation distinguish themselves from different provinces. The five overarching categories identified are hybridisation, fencing, translocation (that includes the import and export of wildlife), permits and hunting.

The following discussion indicates that these species have been allocated specific provincial legislation for three main reasons. The first is to avoid and prevent hybridisation and the second relates to translocation considerations to avoid the spreading of diseases or the transport of animals outside their distribution zone. To further ensure the sustainability of wildlife and to avoid hybridisation, the spread of diseases or the distribution of animals outside their natural distribution range, provinces have also implemented fencing requirements and permit requirements. Lastly, the different provinces have different hunting legislation that is also discussed. The guidelines given on hunting these species are applicable and can be applied to other species if in the same categories in provincial legislation.

The next section gives a general description of the five most prevalent categories, which include hybridisation, fencing, translocation, permits and hunting.

3.4.1 Hybridisation

Hybridisation involves different species or sub-species cross-breeding (South Africa, 2004:21). The hybridisation can be intentional or unintentional and the reason for

hybridisation occurring can be climate change, habitat destructions that force animals to relocate or humans that deliberately translocate or introduce animals into habitats outside their natural distribution range so that they are then considered invasive species. Although hybridisation results in fertile offspring, it is seen as a threat and should be avoided because it reduces the quality of the genetics of animals (Dalton, *et al.*, 2014:2-3; South Africa, 2015b:5; Todesco, *et al.*, 2016:895, 899-900).

Examples of species in which hybridisation can occur are the hartebeest and blesbok, nyala and kudu, eland and kudu, blue and black wildebeest, bontebok and blesbok; testsebe and blesbok; black and white rhinoceros; plains and Cape mountain zebra and African savanna and Indian water buffalo (Bothma & du Toit, 2016:397; Dalton, *et al.*, 2014:1-3). The hybridisation of these species is considered such a threat that different provinces have developed different legislation for some species that will be discussed later.

3.4.2 Fencing

If a farm wishes to be classified as exempted, adequate fencing is compulsory. Adequate fencing is necessary before a game farm can be classified as exempted and given a Certificate of Adequate Enclosure (Taylor, *et al.*, 2016:11-12). A fence that is considered 'adequately enclosed' involves animals being confined to that land in such a way that no animal listed on the exemption permit can escape (North West (South Africa), 2013:38). In some cases the exemption permit is also known as a CoAE.

Fencing regulations should also be considered if there is a change in land-use and wildlife fences may have to change. This fencing legislation is different for different animals. For example, the fencing specification for predators is different to that for antelope. Different types of antelope and predators may also require different fencing requirements. These requirements may further vary depending on the province the animals are kept (North West (South Africa), 2013:18-60).

3.4.3 Translocation

Translocation is done for different reasons and involves different considerations. The reasons being to transport and reintroduce species into new habitats, reduce habitat loss or relocate species because climate change has caused the traditional habitat to change (Aiello, *et al.*, 2014:27-28). The considerations involve the genetics of the herd, the spread of diseases, the population structure and the demographics of a herd of game, animal stress and the new destination and habitat (Aiello, *et al.* 2014:27-28; Souty-Grosset & Grandjean, 2009:2-4). The translocation of wild or captive-reared game species assists with

conservation – especially of rare or endangered species such as the bontebok. The success of translocation is dependent on whether the animals adapt to their new surroundings and whether the habitat can ecologically and sustainably accommodate the species in the long term (Souty-Grosset & Grandjean, 2009:2-4;27-28).

Translocation in the discussion that follow will include the import and export of species into or out of a specific province or South Africa as well as the movement of species between wildlife establishments within a province (Aiello, *et al.*, 2014:27-28; Souty-Grosset & Grandjean, 2009:2-4).

3.4.4 Permits

Permits are issued by authorities and authorise, usually restricted, activities of threatened or protected species (South Africa 2004:22). Permits are required by private wildlife establishments, professional hunters, contractors or taxidermists, breeders and shops that sell products made from indigenous species (Northern Cape (South Africa), 2009: 9, 17). The names for Exemption Permits vary, but an Exemption Permit, Certificate of Adequate Enclosure, Certificate of Sufficient Enclosure and Game Farm Permits mean the same thing, but are terms used in different provinces (Taylor, *et al.*, 2016:11). Some of the permits mentioned in provincial legislation are explained below.

3.4.4.1 Exemption Permit

An exemption permit is usually valid for three years and is only issued if the provincial conservation authorities can prove that the fences that surround a wildlife establishment meet specifications and are adequate for the type of species on the farm (Taylor, *et al.*, 2016:12; Western Cape Nature Conservation Board, 2010:14). The wildlife establishments that apply for and obtain an exemption permit means that any number of species specified on the permit can be hunted, sold or traded except for TOPS species or dangerous game such as elephant, buffalo, leopard and hippopotamus (Taylor, *et al.*, 2016:12-14). The requirements for exemption permits are different for different species and include one or more considerations that relate to veterinary requirements, fencing regulations, hybridisation risks, anti-poaching plans, suitable habitats and natural distribution area (Western Cape Nature Conservation Board, 2010:12-14). Once the exemption permit is issued it may allow wildlife establishment owners to translocate or sell game commercially. However, this is dependent the permit and, in certain cases, additional permits may be necessary (Taylor, *et al.*, 2016:12).

Wildlife establishments that choose not to obtain such an exemption permit must apply for separate permits for each activity mentioned from which registered exempted wildlife establishments are exempted (Taylor, *et al.*, 2016:12; Western Cape Nature Conservation Board, 2010:14). An Exemption permit enables hunters to hunt most species. Without such a permit a hunting licence or hunting permit is needed for any species not mentioned on the permit. The hunting seasons for the species should also be considered and these vary per province (PHASA, 2017). Examples of activities are to capture, transport (import and export), obtain a certificate of adequate enclosure, keep wildlife in captivity, hunt or keep a carcass of an endangered species (Conservation Connected, 2017), breed or trade protected animals (Northern Cape (South Africa), 2009:9,17).

3.4.4.2 Game farm permit

If a game farm permit is issued, landowners and employees can hunt outside of hunting seasons, at night and by means of artificial lights or other hunting method to capture and trade any wild animal mentioned on the permit (Northern Cape (South Africa), 2009:9, 17).

3.4.4.3 Certificate of Adequate Enclosure (CoAE) and Game Management Plan

A Certificate of Adequate Enclosure (CoAE) is a permit that allows a game farm owner to hunt more than bag limits allow, allows game to be hunted from a vehicle in some cases and allows hunters to use some hunting methods that are generally seen as illegal (Western Cape Nature Conservation Board, 2015:8). This document or permit is in accordance with provincial legislation and is only issued to property owners that have adequately enclosed land (South Africa, 2013b:13). Some species are excluded from a CoAE application. Examples are lion, sable and roan, elephant, rhino, endangered, indigenous and certain protected species (Western Cape (South Africa), 2015:8). These aspects are discussed under the provincial legislation as it relates to the specific animal species.

Certain game farms that have game management plans implemented can receive a CoAE permit unconditionally as the game management plan proves that specific requirements are met (Western Cape Nature Conservation Board, 2010:12). The animal species will influence the prerequisites on the game management plan. Game farmers that keep Hartmann's zebra, roan, sable, black and blue wildebeest only need to consider fencing requirements within a game management plan whereas buffalo require fencing and veterinary protocol when considering translocation. The bontebok, blesbok and Plains zebra, in addition, require hybridisation considerations when translocating animals and whether the animals are being moved into an area that is seen as the species natural habitat or natural distribution range (Western Cape Nature Conservation Board, 2010:12-14).

3.4.4.4 TOPS Permit

TOPS stands for Threatened or Protected Species. Species listed as TOPS species means that the species are threatened or protected as per section 56(1) of the Biodiversity Act (South Africa, 2015a:21). Depending on the activities that relate to TOPS species in which a wildlife establishment owner wishes to participate, different TOPS permits with different validity periods may be needed (South Africa, 2013b:28,42). The different permits are also applicable to different specimens within different municipal or provincial areas. Any of these permits will be refused if there is reason to believe that the activity will result in hybridisation, diseases being spread or if the activity will occur outside the natural distribution range of the TOPS species (South Africa, 2013b:41). The different types of permits that involve TOPS species are standing permits, game farm hunting permit, possession permit and a personal effects permit.

A Standing Permit allows the permit holder to take part in restricted activities that involve TOPS species whilst on their own property, such as to have captive breeding operations on the wildlife establishment (South Africa, 2013b:28). A game farm hunting permit enables a registered game farm to hunt, transport and possess the animal mentioned on the permit. A possession permit enables the authorised individual to be in possession of a TOPS species product – not any other activity. A personal effects permit enables an individual to buy, transport, own, or export dead TOPS species or by-products obtained from dead TOPS species. A "personal effects permit" authorises traders to carry out a specific restricted activity, such as to purchase registered wildlife products for non-commercial purposes, a dead specimen of a listed threatened or protected species, including to convey and possess such specimen subsequent to the purchase, or to export such specimen from the Republic during the validity period of the personal effects permit. An ordinary permit authorises the carrying out of one or more restricted activities and species that are listed on the permit (South Africa, 2013b:19).

3.4.4.5 CITES Permit

"CITES" stands for the Convention on International Trade in Endangered Species of Wild Fauna and Flora (South Africa, 2010:13). CITES regulates the movement of animal products – as a whole or as a by-product – internationally when tourists buy animal products or the products are exported for other reasons (CITES, 2014:1,5). To hunt CITES Appendix 1 species, the client must apply for the import permit from the local issuing authority before the hunt. The South African clearing agents will apply for an export permit. To hunt CITES

Appendix 2 species, the South African agents apply for the export permit first and then the import permit will be issued in the international clients' home country (PHASA, 2017).

CITES has divided specific species into different appendices. Appendix 1 includes animals that are only allowed to be traded with under specific circumstances and trade is strictly regulated because of the risk of extinction. Examples are cheetah and leopard (CITES, 2014:7). The cheetah is listed in Appendix I, but does not mention any additional information relating to South Africa. For example, export quotas are only given for Namibia, Botswana and Zimbabwe. The sable is also listed in Appendix 1. (Speciesplus, nd). Appendix II are traded, but require a CITES export permit (CITES, 2014:7). Examples of species listed in Appendix II are bontebok and lion – only in South Africa and Swaziland. In all other countries they are listed in Appendix I. The black rhino is listed in Appendix I except in South Africa. CITES lists hunting quotas for South Africa as five adult males. The Cape mountain zebra and Hartmann's zebra are also listed in Appendix II (Speciesplus, nd) A country requests importing countries to assist and help with regulating import and export by means of a permit (CITES, 2014:7).

3.4.5 Hunting

Hunting regulations and how they differ per province have been discussed. Within each province, different species are classified differently and can be hunted during different times of the year. The times also vary depending on the species and whether the hunt takes place on a farm that has adequate fencing certificate or not (Uys, 2016). The differences have been briefly discussed in the previous section. The section below focuses further on the five categories and how provincial legislation differs for specific species.

3.5 SPECIES SPECIFIC PROVINCE LEGISLATION

The next section discusses and highlights the differences between provincial legislation as it relates to different animals. Differences are mostly related to the five categories indicated in table 3.2. Each section will give a brief background on the specific species and their ideal habitat as well as the threats to the species and habitat that is the reason or cause for the development of legislation.

3.5.1 Provincial bontebok and blesbok legislation

Bontebok are popular for land-use that includes hunting, breeding and game sales. Extensive farming is mostly used to breed bontebok for hunting, semi-intensive farming for game farmers that breed bontebok and intensive farming for game farmers that aim to sell

bontebok at auctions (Radloff, *et al.*, 2016:7). Overall 77% of bontebok hunted involves trophy hunters who acquire an export permit to export the trophies (Department of Environmental Affairs, 2015a:8). The wildlife establishments that have the above land-uses must consider the threats and additional legislation of the bontebok as well as the blesbok.

The threatened status of the bontebok is due to a lack of a meta-population; the bontebok being spread widely across South Africa, genetic diversity, loss due to hybridisation and habitat loss (Department of Environmental Affairs, 2015a:8; Radloff, *et al.*, 2016:4-5; Van Wyk, *et al.*, 2017:221). Throughout South African history, the bontebok have increased and decreased in numbers. The Bontebok National Park helped bontebok numbers to increase, but diseases (lung worm and brown stomach worm) and a copper deficiency caused deaths in 1965. It was during this time that some bontebok were moved to the Eastern Cape and other areas within the Western Cape (Furstenburg, 2016:8). Further threats and reasons for translocation were the small geographical area of suitable habitat (renosterveld, grass and fynbos) that became threatened, partly because it was shared with cattle and sheep farmers (Furstenburg, 2016:6; Radloff, *et al.*, 2016:1-3). The above occurrences led to the bontebok being translocated to other provinces that included the Northern Cape, North West and the Free State provinces in addition to the Western and Eastern Cape provinces (Chief Directorate, nd:1; Department of Environmental Affairs, 2015a:7-8; Radloff, *et al.*, 2016:2-6; Van Wyk, *et al.*, 2017:221).

These decisions to translocate led to bontebok being introduced into areas where the blesbok occurred naturally. The provincial legislation therefore aimed to prevent threats such as hybridisation and poor genetics of especially with the bontebok. (Chief Directorate, nd:1; Department of Environmental Affairs, 2015a:7-8; Radloff, *et al.*, 2016:2-6; Van Wyk, *et al.*, 2017:221). In general there are small variations in hunting legislation across provinces. The Western Cape, Eastern Cape, North West and Free State provinces put in place different additional legislation to minimise threats. Provincial legislation is discussed next.

3.5.1.1 Western Cape province

Cape Nature in the Western Cape created a policy that aims to continue to manage natural bontebok distribution; do genetic testing, remove blesbok from bontebok distribution range and provide guidelines for the hunting and transport of bontebok to eliminate hybrids (Western Cape Nature Conservation Board, 2014:4-5).

Before bontebok and blesbok species can be imported, a game management plan must be provided and a habitat assessment must be done. The end destination may not be a property on which blesbok are kept and a genetic test must be done on the animal being

imported as well as those animals on neighbouring properties of the destination of origin (Western Cape Nature Conservation Board, 2010:7; Western Cape Nature Conservation Board, 2014). If the assessment shows a hybrid, the bontebok and blesbok will not be allowed to be imported into the province (Western Cape Nature Conservation Board, 2010:8). If bontebok are imported into the Western Cape, the animals' offspring must also be genetically tested (Western Cape Nature Conservation Board, 2014). If a bontebok is to be exported, an import permit from the receiving province is necessary to complete the translocation (Western Cape Nature Conservation Board, 2014:8-14). Any wildlife establishment that keeps a bontebok must be located within the natural distribution range of the bontebok which is in the Western Cape and parts of the Eastern Cape, must have a CoAE and must register their wildlife establishment as containing a bontebok with the local authorities (Western Cape Nature Conservation Board, 2014:12-13; Western Cape (South Africa), 2000:48,90-91).

Non-hybrid bontebok and blesbok species kept on wildlife establishments require a 1.4 metre fence and electrification is optional. If bontebok are kept on properties or camps adjacent to blesbok, the fence height should be increased to a 1.8 metre, 6 000 volts electrified fence or, alternatively, two 1.8 metre fences that are 3 metres apart (Western Cape Nature Conservation Board, 2015:10).

Any bontebok trophy hunted as well as exported bontebok must also be accompanied by genetic tests (Western Cape Nature Conservation Board, 2014:10). The bontebok is not mentioned in the Western Cape hunting regulations – a permit is necessary for hunting and other activities. The blesbok can be hunted the whole year round and have unlimited bag limits (Western Cape (South Africa), 2013:30-37).

3.5.1.2 Eastern Cape province

Bontebok protocol in the Eastern Cape province states that a CoAE is necessary for any wildlife establishment that keeps a bontebok. Fencing regulations for such property indicate that a 2,4 metre fence is necessary – especially if bontebok and blesbok are kept on adjacent properties or camps. Such a fence must be certified by the DEDEAT to ensure that bontebok cannot escape and come into contact with blesbok. The main reason for this is that most of the bontebok in the Eastern Cape province are considered pure (not hybrids). Bontebok is classified as pure if a registration certificate is issued; the bontebok itself is tested and comes from a herd of which 20% have been DNA tested and found to be pure. If the bontebok have pure genetics and are microchipped, the authorities will consider hunting,

capturing and translocation permits. If not pure, no permits will be issued and hybrid species may be culled (Chief Directorate, nd:1-5).

The 2017 hunting regulations are divided into three areas. The Transkei, Ciskei and the rest of the province. In any part of the province, except for the Transkei, blesbok can be hunted throughout the year with an unrestricted bag limit. Bontebok is not listed, is considered a TOPS species and therefore requires a permit to be hunted (Ciskei (South Africa), 1987:28; Eastern Cape (South Africa), 2017:31-37). In the Transkei any protected species, which include bontebok and blesbok, can be hunted during any time of the year if a permit is issued for the Transkei region. (Eastern Cape (South Africa), 2017:31-37; Transkei, (South Africa), 1992:51).

3.5.1.3 North West province

The bontebok is seen as an indigenous alien species in the North West province and, because of the hybridisation risk with blesbok, bontebok are not allowed to be transported unless to supplement or enhance the genetic diversity existing bontebok populations (North West (South Africa), 2010:34; North West (South Africa), 2013:33-34; North West (South Africa), 2014:22-24). Hybrid species may also not be translocated out of the province alive and farms on which species were exposed to hybrids will not be considered for exemption (North West (South Africa), 2013:33-34; North West (South Africa), 2014:24).

Blesbok require a 1.4 metre, 12-wire fence. Specific fencing requirements for the bontebok are not mentioned and the requirement can be obtained from the Chief Directorate and is based on separate ecological considerations for each application or enquiry (North West, 2014:24).

The North West Biodiversity Bill of 2015, which will become the North West Biodiversity Management Act (4 of 2016) if implemented, does not mention the bontebok which means a permit must be obtained for activities relating to the specie. The blesbok is classified as a specially protected species. Specially protected species means that it is indigenous to the province and is seen as being threatened. The blesbok is also listed as an ordinary species which means that the blesbok can be captured and transported if a prescribed movement register is used when wildlife establishment owners need to transport blesbok or do a mass capture (North West (South Africa), 2016b:25,39,54,63; North West (South Africa), 2017b:44-60; Bophuthatswana (South Africa), 1973:5,21-22). A hunting licence is necessary for landowners to hunt the species on their own farms. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July (North West (South Africa), 2017b:14-23).

3.5.1.4 Free State province

To keep a bontebok in the Free State province, a CoAE is compulsory. The area must be larger than 100ha, not border a Free State Protected Area and have a fence that is game proof and 1.4 metres high. Such a fence must be doubled if blesbok are kept on a property or camp and are kept adjacent to bontebok (Free State (South Africa), 2013:2-6).

These reason for the above legislation is to avoid hybridisation between the bontebok and blesbok as well as bontebok and tsessebe. Hybrids are culled if found (Free State (South Africa), 2013:6). No hybrid species may be translocated into the province and if translocation is allowed the animal(s) must be kept in a pen until DNA testing confirms that the genetics of the species is pure. The animal must then be microchipped before a certificate of purity is issued. A certificate of purity is necessary if bontebok are to be sold at live auctions. For other activities, such as to keep, hunt, transport, import and export bontebok, permits must be obtained. Permits issued to capture bontebok will only be issued and allowed between 1 April and 30 September (Free State (South Africa), 2013:2-6). If the wildlife establishment is registered as a TOPS farm, hunting can take place throughout the year. If not, bontebok can be hunted between 1 April and 31 October with a permit (Free State (South Africa), 1969:21-22,26; Free State Province (South Africa), 2014:1).

The blesbok is classified as ordinary game and, if a fencing certificate is valid, blesbok can be hunted during the whole year in the entire province. If there is no valid fencing certificate then blesbok can only be hunted between 1 April and 30 September (Free State (South Africa), 2014:1; Free State (South Africa), 1969:21-22,26).

The other provinces are outside the distribution range of the bontebok and the bontebok is not mentioned in hunting legislation. There are hunting regulations in place for blesbok and for bontebok which are discussed below.

3.5.1.5 KwaZulu-Natal province

The bontebok is not mentioned in KwaZulu-Natal province Hunting Regulations as it is outside of the natural distribution range. The blesbok is classified as open game and can be hunted throughout the year in the whole province. No permit is required to hunt blesbok, but the owner on whose wildlife establishment the hunt takes place has to give permission for the hunt (KwaZulu-Natal (South Africa), 2015:1).

3.5.1.6 Limpopo province

Neither blesbuck nor bontebok are mentioned in the Limpopo province Hunting Regulation. The blesbok and bontebok are classified as non-indigenous wild animals and need a permit to be hunted at night otherwise permission must be given from the landowner. This includes the species that are cross-breeds, have colour variants and have genetic variations or modifications (Limpopo (South Africa), 2003:15,47; Limpopo (South Africa), 2017:12-18). Examples are the yellow and white blesbok which are not allowed to be hunted in the Limpopo province. Common blesbok needs landowner's permission. For bontebok, a TOPS permit is necessary since the bontebok is classified as a TOPS species listed and on the CITES addendum 1 list (Limpopo Hunters, 2017).

3.5.1.7 Mpumalanga province

The Blesbok can be hunted throughout the year within specific areas within the province if the hunter is the owner of the wildlife establishment. If the hunter is not the owner, the hunt can take place between 1 May and 31 July (Mpumalanga (South Africa), 2017:18-23).

3.5.1.8 Gauteng province

In the Nature Conservation Ordinance 12 of 1983 the bontebok is classified as protected game which means activities that involve these species require a permit. No further information, such as bag limits or hunting seasons are given. Such information is indicated on the permit (Gauteng (South Africa), 1983: 23,72). The Gauteng province Hunting Regulations also do not mention the blesbok or bontebok (Gauteng (South Africa), 2015). The Gauteng Nature Conservation Bill of 2014 doesn't mention a list of species or how the species are classified. National legislation should therefore be used (Gauteng (South Africa), 2014:1-50).

3.5.1.9 Northern Cape province

The Northern Cape province's hunting regulations state that both the blesbok and bontebok are seen as protected species and can be hunted from 1 May to 31 August. The maximum number of blesbok that can be hunted is five per person per day and bontebok is one per person per day (Northern Cape (South Africa), 2009:5-7). In the Northern Cape Nature Conservation Act (9 of 2009) the bontebok and blesbok are also listed as protected species, which means a permit is necessary to hunt, translocate, keep, possess, breed or trade blesbok and bontebok. In addition, a hunting licence is necessary unless a game farm permit

or permit to hunt a protected animal is issued (Northern Cape (South Africa), 2009:41,61,72).

3.5.1.10 Conclusion and comparison on bontebok and blesbok provincial legislation

Based on this discussion and legislation, the following similarities and differences are evident in provincial legislation for the Western Cape, Eastern Cape, North West and Free State provinces that pertains to especially the bontebok and blesbok. No hybrid species will be allowed to be transported into any of the four provinces and genetic DNA tests are done to determine whether or not the bontebok is pure. Pure bontebok in the Western Cape province needs game management plan and CoAE is necessary. A CoAE is also necessary for keeping bontebok in the Eastern Cape and the Free State province. In the North West province fencing requirements are obtained from the Chief Directorate and may vary depending on individual ecological circumstances of the property. In the Western Cape province, a 1.4 metre fence is necessary and electrification is optional. If pure bontebok are kept on a property or camp adjacent to blesbok the height of the fence should be increased to a 1.8 metre, 6000 volts electrified fence or, alternatively, two 1.8 metre fences that are 3 metres apart. In the Eastern Cape province, the fence height is increased to 2.4 metres especially if the two species are kept on adjacent properties or camps. In addition, the fence must be certified by the DEDEAT. In the Northern Cape province there is no set fencing requirements for the blesbok as fencing regulations are individually determined based on each wildlife establishment that applies to keep bontebok. If only blesbok are kept, a 1.4 metre fence is sufficient. In the Free State province, if only one of the species is kept, a 1.4 metre fence is necessary which must be doubled if blesbok are kept adjacent to bontebok.

A permit is required to hunt bontebok in the Western Cape province and the hunted bontebok must also be tested. In the Eastern Cape, North West province, Free State, KwaZulu-Natal, Limpopo, Mpumalanga, Gauteng provinces bontebok requires a permit since it is listed as a TOPS species and not necessarily mentioned in some of the hunting legislation. Certain provinces stipulate specific times of the year during which these species can be hunted.

In the North West province, if not hunted on an exempted farm, the bontebok and blesbok can only be hunted from 1 April to 30 September. If a TOPS permit is allocated to the wildlife establishment hunting can take place from 1 April to 31 October. In the Northern Cape province, both species are seen as protected species and are only be allowed to be hunted from 1 May to 31 August. The Northern Cape province is also the only province that stipulates bag limits in hunting regulations – five per person per day for blesbok and one per person per day for bontebok.

This discussion summarised the main differences in provincial legislation as it relates to the bontebok and blesbok. The next section will focus on provincial legislation as it relates to the buffalo.

3.5.2 Provincial buffalo legislation

Game sales and breeding are popular land-uses for buffalo - especially disease-free buffalo. Other land-uses involving meat (currently more internationally) are to breed buffalo, buffalo with trophy quality horns and to hunt buffalo as trophies (Tambling, *et al.*, 2016a:1).

The African buffalo can survive in many different biomes that vary from forests, savannahs, grassland and bushveld. An ideal wildlife biome would include cover against predators, water, the ability to move or migrate and foraging (Tambling, *et al.*, 2016a:3). The wide variety of biomes in which buffalo occur is indicated in the map.

The variety of biomes enable buffalo to occur in all provinces, but to a lesser extent in parts of the Northern Cape, Eastern Cape and KwaZulu-Natal provinces (IUCN SSC Antelope Specialist Group, 2008). Within the northern provinces, diseases are the main threat to buffalo and the reason for provincial legislation. Originally, the rinderpest reduced buffalo and livestock. Today bovine tuberculosis (TB), foot and mouth disease (FMD), brucellosis and corridor disease are diseases that buffalo carry that can easily be transmitted to livestock and humans (Tambling, *et al.*, 2016a:2,5). The diseases are described in chapter 4. Because buffalo easily spread diseases and the distinction between buffalo with diseases and those that are disease free, there have been national regulations put in place. The aim of these regulations is to ensure that buffalo are not kept on the same property as other cloven-hoofed animals; that buffalo are not infected with diseases and that the diseases are not spread into a larger geographical areas within South Africa, like Addo in the Eastern Cape province that has disease free buffalo (Tambling, *et al.*, 2016a:2,5). The provincial legislation is discussed below.

3.5.2.1 Western Cape province

The Western Cape province's hunting regulations do not mention buffalo (Western Cape (South Africa), 2013:3037-3039). In the Western Cape Nature Conservation Laws amendment Act of 2000 the buffalo are listed as protected wild animals which means a CoAE is necessary to keep these species (Western Cape Nature Conservation Laws amendment Act of 2000:90-91). Fencing regulations for such wildlife establishment indicate that the fences for Cape buffalo must be patrolled, be 1.8 metres high and be electrified (Western Cape Nature Conservation Board, 2015:11). No hybrid buffalo species will be

allowed to be imported into the province and before African buffalo species can be imported, a game management plan must be provided and a habitat assessment for the end-location be carried out (Western Cape Nature Conservation Board, 2010:7-8).

3.5.2.2 Eastern Cape province

Buffalo in the Eastern Cape province area are disease free (Tambling, *et al.*, 2016a:2,5). There is no province-specific legislation for buffalo in the Eastern Cape province, except for that which relates to hunting.

In the Eastern Cape province Hunting Regulations are given for the Ciskei, Transkei and the rest of the province (Eastern Cape (South Africa), 2016:33-40). The Ciskei's hunting section doesn't mention buffalo, but other Ciskei legislation lists the African buffalo as a protected wild animal which means a permit is necessary to hunt, sell and trade with buffalo within the open season unless the permit states otherwise (Eastern Cape (South Africa), 2017:33-40; Ciskei, 1987:28). In the Transkei's hunting section the buffalo is not mentioned and there is no specified hunting season. Hunting can take place if the hunter has a permit (Eastern Cape (South Africa), 2017:37). Other Transkei legislation classifies the buffalo as protected game which means a permit is necessary for other activities such as selling and trading buffalo (Transkei (South Africa), 1992:51).

3.5.2.3 North West province

The North West province prevents buffalo from being imported or sold to Northern Cape province wildlife owners at auctions if that buffalo did not originally occur within the province (North West (South Africa), 2013:33). Certain species, like the forest buffalo that generally may not be imported or sold to North West farmers, may be owned if a risk assessment was done or if the aim is to supplement existing populations that were translocated before legislation existed (North West (South Africa), 2013:33). Wildlife establishments that keep buffalo must have a 1.4 metre, 12-string electrified fence (North West (South Africa), 2010:33).

The North West Biodiversity Bill of 2015 will become the North West Biodiversity Management Act (4 of 2016) if implemented and classifies the buffalo as a specially protected species and game which means that it is indigenous to the province, is seen as being threatened and permits are required for any activity that involves the buffalo (North West (South Africa), 2016b:25,39,54,63; North West (South Africa), 2017b:44-60). A hunting licence is necessary for landowners to hunt the species on their own farms. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July (North West (South Africa), 2017a:14-23).

3.5.2.4 Free State province

The Buffalo is classified as an ordinary species in provincial legislation and can be hunted throughout the year if the wildlife establishment has a CoAE on which buffalo is mentioned (Free State (South Africa), 2014:1). A hunting licence is necessary if the hunter hunts on a wildlife establishment of which he/she is not the owner (Free State (South Africa), 1969:21-22,26).

3.5.2.5 KwaZulu-Natal, Limpopo, Mpumalanga provinces

Buffalo kept in these three provinces have some legislation that is applicable to all buffalo in the province because of diseases. Buffalo-free zones exist on which no buffalo may be kept (National Department of Agriculture, Forestry and Fisheries, 2012:5). In areas where buffalo are allowed to be kept, there are fencing regulations that should be considered. Buffalo kept on properties in disease-controlled areas must have electric fences (5 000 volts) which should be increased to 6 000 volts if there are other animals, like giraffe and elephant, on the same or adjacent property that require a proper fence. Disease-free buffalo kept on farms that are located in a Foot-and-Mouth Disease (FMD) surveillance area must have a double fence that is electrified, at least 5 metres apart and must be at least 100 metres apart from land on which infected buffalo occur. Buffalo kept in a surveillance zone must have three electrified fences if kept next to international borders or if adjacent to an infected area. A single game-proof fence can be used for buffalo kept in disease-free areas, with the exception of certain parts of the KwaZulu-Natal province (National Department of Agriculture, Forestry and Fisheries, 2012:2-5).

Buffalo are only allowed to be transported if they are tested, microchipped and have a Red-Cross Permit (National Department of Agriculture, Forestry and fisheries, 2012:5-7). Before, during and after transport, wildlife establishment owners and transport operators must follow certain protocols that relate to fences, size of enclosures, the cleaning of trucks, quarantine, changing workplace from an area where an infected buffalo is kept to where a disease-free buffalo is kept (National Department of Agriculture, Forestry and Fisheries, 2012:9-12; National Department of Agriculture, Forestry and Fisheries, 2017:19-21).

3.5.2.6 KwaZulu-Natal province

In KwaZulu-Natal province, on wildlife properties that are adjacent to Mozambique and Zimbabwe and that fall within the Food and Mouth Disease (FMD) protected zones and Corridor Disease controlled area, the property must be separated from the neighbouring country and infected zones by three electrified fences of which the outer two are 100 metres

apart (National Department of Agriculture, Forestry and Fisheries, 2017:30-31). When buffalo are translocated out of a FMD area or out of a CD area, the owners may apply for exemption that will allow them to move buffalo out of the protected zone if the buffalo is tested negatively for diseases (National Department of Agriculture, Forestry and Fisheries, 2017:31-32).

The KwaZulu-Natal Nature Conservation Management Amendment Act, 5 of 1999 classifies buffalo as protected indigenous animals which means that buffalo cannot be hunted, bought, sold or translocated without a permit (KwaZulu-Natal (South Africa), 1999:16-21,42). This is reiterated in hunting legislation that states that the buffalo is classified as a 'species of protected game' and can be hunted from 31 May to 31 August. A protected game permit is required by the landowners and a protected game license if the hunter is not the landowner. A bag limit for buffalo is not indicated in the hunting proclamation (KwaZulu-Natal (South Africa), 2015:2).

3.5.2.7 Limpopo province

Buffalo are not mentioned in the Limpopo province hunting regulations, but are classified as a protected wild animal which means a professional hunter must supervise a hunt and buffalo can only be hunted on exempted farms with permission from the landowner (Limpopo Hunters, 2017; Limpopo (South Africa), 2003:15,47; Limpopo (South Africa), 2017:12-18).

3.5.2.8 Mpumalanga province

The Mpumalanga Hunting Proclamation does not mention buffalo, but the Mpumalanga Nature Conservation Act (10 of 1998) classifies buffalo as a protected wild animal which means a permit is required for activities involving buffalo (Mpumalanga (South Africa), 2017:18-23; Mpumalanga, 1998:9).

3.5.2.9 Gauteng province

The Gauteng province Hunting Regulations do not mention buffalo, but other provincial legislation classifies buffalo as a protected wild animal which means buffalo are not allowed to be hunted on farms where cattle occur, unless the owner authorises the hunt or the buffalo is seen causing damage. For any other activities relating to buffalo, a permit is necessary (Gauteng (South Africa), 1983:7-8,23,39; Gauteng (South Africa), 2015).

3.5.2.10 Northern Cape province

The Northern Cape province Hunting Proclamation does not mention buffalo but provincial environmental legislation lists buffalo as a protected species. This means that a permit is necessary to hunt, translocate, keep, possess, breed or trade with buffalo. In addition, a hunting licence is necessary unless a game farm permit or permit to hunt a protected animal is issued (Northern Cape (South Africa) 2009:41,61,72; Northern Cape (South Africa), 2012:5-7).

3.5.2.11 Conclusion and comparison on provincial buffalo legislation

In the Western Cape province, a CoAE is necessary to keep buffalo. New buffalo translocated to new properties in the Western Cape province require a game management plan and habitat assessment. In the North West province, buffalo are not allowed to be transported into the province unless the buffalo originally occurred in the province. In the KwaZulu-Natal, Limpopo and Mpumalanga provinces buffalo must be tested, microchipped and have the necessary permits to be transported.

In the Western Cape province, fencing regulations involve a 1.8 metre electrified fence. In the North West province, fencing regulations mention a 1.4 metre fence. In KwaZulu-Natal, Limpopo and Mpumalanga provinces there are disease controlled areas where buffalo must be fenced by a 5 000 volt fence that are increased to 6 000 volts depending on whether other species are kept. Disease-free buffalo in these provinces that are located in diseased areas should have double electrified fences that are within five metres apart. In addition, the fence must be 100 metres from the area where diseased buffalo are kept. If the wildlife establishment is kept on a surveillance zone or international border, three electrified fences are required. A single fence is seen as sufficient for buffalo kept in disease-free areas.

In the Western Cape, Eastern Cape, KwaZulu-Natal, Gauteng and Northern Cape provinces buffalo are mentioned in some legislation and, in all these provinces, a permit is necessary to hunt the species as per national legislation. The Northern Cape province legislation states that a hunting licence is necessary if a game farm permit or permit to hunt protected animals is not obtained. In the North West province, if the farm is exempted, buffalo can be hunted throughout the year. If not exempted, buffalo can only be hunted from 1 May to 31 July. On a non-exempted farm, the owner needs a hunting licence if the hunt takes place on a farm of which he is the owner and a hunting permit if the hunter is not the owner of the game farm. In the Limpopo province, a professional hunter must accompany hunters and the hunt must take place on an exempted farm.

3.5.3 Provincial predator legislation

The predators that have specific provincial legislation in different province mostly occur with lion, leopard and cheetah.

- *Lions*

Land-use for lion is popular with hunters and can produce by-products that are mostly exported to Asia (Miller, *et al.*, 2016:2). Similar to some other species, hunting wild lions is not very popular amongst trophy hunters because with intensively bred lions the quality of the trophy is better (Department of Environmental Affairs, 2015a:14).

Lions have a broad habitat options that include most biomes except for the central Sahara desert and tropical rain forests. Naturally, they can occur throughout South Africa but, because of habitat degradation, most lions occur in National Parks (Miller, *et al.*, 2016:2-4). Reasons for legislation stem from lion numbers declining due to habitat loss, them being killed because they threatened livestock, too little prey and historically poor hunting regulations (Department of Environmental Affairs, 2015a:7)

- *Leopard*

The leopard flourish more in protected areas (Swanpoel, *et al.*, 2016:3), but are advantageous for private wildlife establishments because it is attractive for tourism and trophy hunting especially in the North West province, KwaZulu-Natal and Mpumalanga provinces (Lindsey, *et al.*, 2011a:11; Scientific Authority of South Africa, 2015:8; Swanepoel, *et al.*, 2016:5).

Leopards, like lions, also occur in most biomes with the exception of Nama Karoo and Succulent Karoo biomes. Mountainous areas, savannah, grassland, woodlands and coastal areas and semi-desert are acceptable. Wooded and rocky biomes are preferred. Within these biomes, leopards are able to survive eating many different species. The multiple suitable habitats allow for leopards to occur in most provinces with the exception of the Free State province, Karoo and Northern and Western Cape provinces. The threats to leopards that encourage legislation stem from habitat destruction, poor hunting control, decline in available prey and cultural and traditional by-product needs (Scientific Authority of South Africa, 2015:8; Stein, *et al.*, 2016:2,8,9,13; Swaneoeel, *et al.*, 2016:1-4).

- *Cheetah*

Cheetah are popular for wildlife establishments that incorporate tourism. This includes cheetah that are viewed through wildlife tourism and cheetah kept in captivity (Marnewick & Cadman, 2012:2-4).

Cheetah can also survive in a wide variety of habitats – especially if sufficient food is available (Child, *et al.*, 2016:4). Cheetah require a larger habitat than other predators and threats and reasons why legislation stem from the fact that their habitat is destroyed and conflict between farmers in areas where the cheetah is free-roaming (Durant, *et al.*, 2015:12; Marnewick & Cadman, 2012:2-4).

3.5.3.1 Western Cape province

Lions require a 2.4 metre 6 000 volts electrified fence with a 1 metre overhang that surrounds a minimum camp size of 2 000m². Such a camp provides adequate size for four animals. Leopard should have a 3 metre 6 000 volt electrified fence with a 1 metre overhang. The minimum cage size is 500m². Cheetah require a 2.4 metre 6 000 volt electrified fence that surrounds a cage size of at least 800m² per animal kept. For all three of these predator species, a buffer fence of 1.5 metres from the main fence is necessary (Western Cape (South Africa), 2014:12-16).

The provincial hunting regulations do not mention lion, leopard or cheetah (Western Cape (South Africa), 2013:3037-3039). In the Western Cape province, lion and leopard are listed as protected wild animals which means that a CoAE is necessary to keep these species. The cheetah is listed as an endangered wild animal which means it cannot be owned or hunted without a permit or licence. Exception is made for owners that hunt or possess these species on their own property (Western Cape (South Africa), 2000:88-91).

3.5.3.2 Eastern Cape province

The Eastern Cape province has little legislation that pertains specifically to predators. In the Eastern Cape province's Hunting Regulations for the Ciskei, Transkei and the rest of the province. predators are not mentioned (Eastern Cape (South Africa), 2017:32-39). In the Transkei, the leopard is classified as a protected wild animal and permits are necessary to hunt, sell or trade leopard as well as other activities concerning leopard. Lion and cheetah are not mentioned (Transkei (South Africa), 1992:51). In the Ciskei, the cheetah is listed as an endangered wild animal and the lion and leopard as protected wild animals. These species need a permit if they are to be hunted, sold, donated, or bought. Unless the permit

indicates otherwise, these activities will only be allowed in what is classified as open season (Ciskei (South Africa), 1987:10-11,26-28).

3.5.3.3 North West province

The North West province mentions legislation for predators that relate to fencing, translocation and permits.

Farms on which predators occur will not qualify for exemption (North West (South Africa), 2010:34). Throughout the rest of the province, permits and management plans are necessary for the translocation and keeping of predators (lion, cheetah, leopard (North West (South Africa), 2010:34). The North West Biodiversity Bill of 2015, which will become the North West Biodiversity Management Act (4 of 2016) if approved, does not mention lion or leopard (North West (South Africa), 2016a:44-63; North West (South Africa), 2016b:25,39,54,63;). Predators (lion and cheetah) have separate fencing requirements. For lion, a double 2.4 metre electrified fence. For cheetah the double fence consists of a 2.4 metre outside fence and a 3 metre inside fence that must be electrified (North West (South Africa), 2010:46-51;12:41-50). A hunting licence is necessary for landowners to hunt the species on their own farms. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July (North West (South Africa), 2017b:41-51).

3.5.3.4 Free State province

Owners of predators must obtain permits to hunt large predators and may not hunt predators in an area adjacent to where large predators are kept or released 30 days before a hunt is scheduled. Hunting must occur in areas larger than 1 000 ha that is fenced as per regulations. The predator being hunted must also be microchipped and predator breeders must be registered. Government officials must be present during a predator hunt and the hunting camp must include two additional species of game on which lion can prey (Free State (South Africa), 2013:7-9).

None of the abovementioned predators are mentioned in the Free State province Hunting Proclamations or Provincial Nature Conservation Ordinance (Free State (South Africa), 1969:21-22,26; Free State (South Africa), 2014:1).

3.5.3.5 KwaZulu-Natal province

KwaZulu-Natal province Hunting Regulations lists lion and leopard as TOPS species and classified them as specially protected game (KwaZulu-Natal (South Africa), 2015:2).

Specially Protected Game require a permit to, amongst others, hunt, buy, sell or translocate predators (KwaZulu-Natal (South Africa), 1999:16-24). An integrated permit, TOPS permit and Ordinance permit are needed to hunt these predators. There is no specific hunting season given and, once a permit is issued, it will indicate how many species can be hunted and when (KwaZulu-Natal (South Africa), 2015:2). Other provincial legislation classifies lion and leopard as protected indigenous animals. Cheetah are also classified as a protected indigenous species, but are not allowed to be hunted in KwaZulu-Natal (KwaZulu-Natal (South Africa), 1999:42; KwaZulu-Natal(South Africa) , 2015:2).

3.5.3.6 Limpopo province

Lion and leopard are not mentioned in the Limpopo province hunting regulations (Limpopo (South Africa), 2017:12-18). Other Limpopo province legislation classifies lion and leopard as wild animals which means an owner must give permission for the hunt to take place and the species may not be tranquilised, drugged or immobilised or lured through sound or bait (Limpopo (South Africa), 2003:15-16,47). Ordinary permits for TOPS species are needed as, in South Africa, both species are seen as TOPS species. If exported, CITES permits are needed as the leopard is listed in CITES' Appendix 1 and the lion in Appendix 2 if exported (Limpopo Hunters, 2017).

3.5.3.7 Mpumalanga province

The Mpumalanga province hunting legislation does not mention the any of these predators (Mpumalanga (South Africa), 2017). The Mpumalanga Nature Conservation Act (10 of 1998:9) classifies the lion, leopard and cheetah as protected wild animals and, if hunted, permits are required.

3.5.3.8 Gauteng province

The Gauteng Nature Conservation Bill of 2014 and the recent Gauteng province Hunting Regulations don't mention a list of species and the species classification within the province (Gauteng (South Africa), 2014:1-50; Gauteng (South Africa), 2015). The province's Nature Conservation Ordinance classified lion, leopard and cheetah as protected wild animals, which means the predators are not allowed to be hunted on farms where cattle occur, unless the owner authorises the hunt or unless it is a damage-causing animal. Permits are necessary for any other activity that involves these species (Gauteng (South Africa), 1983 7-8,23,39).

3.5.3.9 Northern Cape province

The Northern Cape province Hunting Regulations do not mention predators (Northern Cape (South Africa), 2009:7). The province's conservation act classifies lion, leopard and cheetah as specially protected game which means a permit is necessary to hunt, breed, trade, capture or translocate these animals (Northern Cape (South Africa), 2009:41,61-62).

3.5.3.10 Conclusion and comparison on provincial predator legislation

In the Western Cape province a CoAE is necessary to keep lion and leopard and no farms on which predators are kept qualify for exemption. The Western Cape and Free State provinces are the only two provinces that specifically indicate the minimum space that is needed to keep and hunt predators. The Western Cape province fencing requirements are a 2.4 metre electrified fence for lion and leopard and a 3 metre fence for cheetah. A second 1.5 metre fence is necessary in both cases. In the North West province the height of the fences is the same, but the outside fence is 2.4 metres.

In the Western Cape, Eastern Cape, North West, KwaZulu-Natal, Limpopo, Mpumalanga, Gauteng and Northern Cape provinces permits are necessary for any activity that involves predators. Landowners that hunt on their own farms require a hunting licence and can hunt predators between 1 May and 31 July. Unlike in the Western Cape province that doesn't allow exemption, the North West province allows exemption and hunting can take place throughout the year. In the Free State province, microchipped predators are allowed to be hunted microchipped with permits, in an area larger than 1 000 ha, with government officials present. The area of the hunt must also include two species on which predators can prey.

3.5.4 Provincial rhino legislation

Hunting is a popular land-use activity, however the increasing security costs associated with keeping rhino reduce the popularity of hosting this species on private wildlife establishments. Thus, unlike most of the other species discussed, the threat to the rhino and the reason for legislation does not stem from habitat degradation, diseases or hybridisation. The threat that led to legislation mostly stems from poaching threats that are linked to medicinal, traditional and other by-products uses (Emslie, 2012:3-7).

3.5.4.1 Western Cape province

No hybrid species will be allowed to be imported into the province (Western Cape Nature Conservation Board, 2010:8). If any rhino is imported it must be preceded with a game management plan and a habitat assessment must be done (Western Cape Nature

Conservation Board, 2010:7). Fences for white and black rhino on a wildlife establishment must be patrolled, be 1.8 metres high and electrified with 6 000 volts (Western Cape Nature Conservation Board, 2015:13-14).

In the Western Cape province the white and black rhino are listed as endangered wild animals which means they cannot be owned or hunted without a permit or licence. Other 'activities' also require a permit. An exception is an owner that hunts or owns these species on their own property. (Western Cape (South Africa), 2000:42-44,88).

3.5.4.2 Eastern Cape province

In the Eastern Cape province hunting legislation and the Ciskei and Transkei conservation legislation, rhino are not mentioned. In the Transkei there is no specified hunting season. Hunting can take place if the hunter has a permit (Ciskei (South Africa), 1987; Eastern Cape (South Africa), 2017:32-39). Other Transkei legislation classifies the white and black rhino as protected wild animals and permits are necessary for hunting, selling, trading and other activities (Transkei (South Africa), 1992:51).

3.5.4.3 North West province

With regards to rhino, the farm must be larger than 400ha and be adequately fenced. White and black rhino require a 1.4 metre, 12-string electrified fence (North West (South Africa), 2014:22-24). If a white rhino is kept on a property that has a fence higher than 1.4 metres the electrical specification for fences is waived unless there are other species that still require an electric fence (North West (South Africa), 2010:41).

Permits and management plans are necessary for the translocation and keeping of the black rhino (North West (South Africa), 2010:34). The North West Biodiversity Bill of 2015, which will become the North West Biodiversity Management Act (4 of 2016) if implemented, does not mention white or black rhino, but states that national legislation applies as it relates to TOPS species (North West (South Africa), 2016b:29). A hunting licence is necessary for landowners to hunt the species on their own farms. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July (North West (South Africa), 2017a:14-23).

3.5.4.4 Free State province

Neither white nor black rhino are mentioned in the provincial hunting proclamation (Free State Province, 2014:1). Additional provincial rhino legislation restricts the hunting of rhino to one adult male rhino per person per year. A permit for every action before, during and after

the hunt is necessary (Free State (South Africa), 2013:10-11). For example, permits are needed to hunt a rhino if the meat is removed from the rhino and to transport the rhino to, for example, the taxidermist or freight agent for export (Free State (South Africa), 2013:10-11). Clients may have to undergo a readiness and competency test together with a shooting practice test to verify that the clients are able to hunt large and dangerous mammals. A hunting trophy, in this instance, involves a full or shoulder mount and, if exported, the raw products can include the full skin, skull, horns, feet and tail. The minimum part of a trophy that is allowed to be exported is a microchipped horn on a shoulder mount or the horns and cape (Free State (South Africa), 2012:6).

3.5.4.5 KwaZulu-Natal province

The KwaZulu-Natal Nature Conservation Management Amendment Act, 5 of 1999 classifies white rhino as protected indigenous animals which have the same regulations of specially protected species mentioned above. The black rhino is not mentioned (KwaZulu-Natal (South Africa), 1999:16-24, 42). The provincial hunting regulations classify white and black rhino as TOPS species which are considered as specially protected game (KwaZulu-Natal (South Africa), 2015:2). There is no specific hunting season given and, once a permit is issued, it will indicate how many species can be hunted and when. An integrated permit, TOPS permit and Ordinance permit is needed to hunt these rhino (KwaZulu-Natal (South Africa), 2015:2) and a Specially Protected Game permit to, amongst others, hunt, buy, sell or translocate rhino (KwaZulu-Natal (South Africa), 1999:16-24).

3.5.4.6 Limpopo province

Neither the white nor black rhino are mentioned in the Limpopo province hunting regulations. In the Limpopo National Environmental Management Act (7 of 2003) rhino are classified as specially protected wild animals which means a hunt must be accompanied by a professional hunter (Limpopo (South Africa), 2003:15-16,47). Black rhino are listed in CITES Appendix 1 and as a TOPS species is not allowed to be exported to the USA. White rhino are also listed as a TOPS species as well as in CITES Addendum 2. A CITES and TOPS permit is needed to hunt both these species (Limpopo Hunters 2017).

3.5.4.7 Mpumalanga province

The Mpumalanga Hunting Proclamation does not mention rhino and the conservation act classifies them as specially protected species. Permits are therefore necessary for activities involving these species (Mpumalanga (South Africa), 1998; Mpumalanga (South Africa), 2017:18-36).

3.5.4.8 Gauteng province

The Gauteng province Hunting Regulations and the province's nature conservation ordinance does not mention white or black rhino (Gauteng (South Africa), 1983; Gauteng (South Africa), 2015).

3.5.4.9 Northern Cape province

The Northern Cape province's hunting regulations do not mention black and white rhino (Northern Cape (South Africa), 2009:7). In the Northern Cape's Conservation Act, the black and white rhino are classified as specially protected game which means a permit is necessary to hunt, breed, trade, capture or translocate these animals (Northern Cape (South Africa), 2009:41,61-62).

3.5.4.10 Conclusion and comparison of provincial rhino legislation

Rhino imported into the Western Cape and North West provinces need a game management plan and habitat assessment plan.

In the Western Cape province, wildlife establishments that keep rhino must have 1.8 metre 6 000 volt electrified fence that is patrolled. In the North West province, fencing regulations for white and black rhino are a 1.4 metre electrified fence. If the white rhino is kept on a property that has a fence higher than 1.4 metres, the fence does not have to be electrified unless there are other species kept with the rhino that require electrified fences.

Unless the hunter is the owner of a property, a permit is necessary to hunt rhino in the Western Cape province. Permits are also needed in the Western Cape, Eastern Cape, Free State, KwaZulu-Natal, North West, Limpopo, Mpumalanga, Gauteng and Northern Cape provinces for any activity that includes white or black rhino. The Free State province is the only province that gives a bag limit for the hunt of rhino – one adult male per person per year. In the Limpopo province, a permit is also necessary to hunt rhino and the hunter must be accompanied by a professional hunter. Black rhino are not allowed to be exported to the USA.

3.5.5 Black and blue wildebeest

Black wildebeest occur mostly within the central areas of South Africa. Provinces include Free State, Gauteng, North West, Northern Cape, Eastern Cape, Mpumalanga and KwaZulu-Natal provinces. Black wildebeest are grazers and their ideal habitat involves short grass, open plains and Karoo shrubs (Child, *et al.*, 2016:6; Tambling, *et al.*, 2016b:1-4). Blue

wildebeest prefer dry open savannah, bushland, grassland and woodland biomes. The reason for legislation is due to increased human settlements and livestock farming that have reduced habitat size and prevented migration (IUCN SSC Antelope Specialist Group, 2016:4-5). This led to the threat of hybridisation between the blue and black wildebeest. Threats may increase and include climate change in the future. The reason being that climate change will alter existing habitats even more and to such an extent that it will not be favourable for wildebeest (Child, *et al.*, 2016:61,2,5,7).

The two species do not naturally interbreed because their habitats are different and they had more space to migrate (Tambling, *et al.*, 2016b:5). However, habitat reduction that restricted their movement is one reason for current hybridisation threats which led to some legislation (Child, *et al.*, 2016:1-3). First generation hybrid offspring are more difficult to notice than second generation offspring (Child, *et al.*, 2016:6). translocation protocols that aim to separate the black wildebeest from the blue wildebeest Hybridisation is therefore the reason for increased management regulations and (Child, *et al.*, 2016:1-3). Overall, the aim is to keep the two species separate and the species are not allowed to be translocated if there is a risk of hybridisation (Child, *et al.*, 2016:6). Different provincial legislation is discussed next.

3.5.5.1 Western Cape province

Legislation in the Western Cape province that relates to the black or blue wildebeest refers to fencing, translocation, hybridisation and hunting.

No wildebeest hybrid species will be allowed to be imported into the province (Western Cape Nature Conservation Board, 2010:8). To ensure this, before black and blue wildebeest species can be imported, a game management plan must be provided and a habitat assessment must be done (Western Cape Nature Conservation Board, 2010:7). Non-hybrid species kept on wildlife establishments require a 1.4 metre fence and electrification is optional. If black wildebeest are kept on properties or camps adjacent to blue wildebeest the fence height should be increased to a 1.8 metre fence and electrification of 6 000 volts becomes compulsory. Alternatively, two 1.8 metre fences that are 3 metres apart is seen as sufficient (Western Cape Nature Conservation Board, 2014:10)

In the Western Cape Nature Conservation Laws amendment Act of 2000, the black and blue wildebeest are listed as protected wild animals which means a CoAE is necessary to keep these species (Western Cape (South Africa), 2000:42-44,88). In the Western Cape province hunting regulations, the black and blue wildebeest can be hunted in unlimited numbers

throughout the year. This includes bow hunting that is not mentioned in other provincial legislation (Western Cape (South Africa), 2013:3037).

3.5.5.2 Eastern Cape province

In the Eastern Cape province hunting regulations, the hunting regulations for the Ciskei, Transkei and the rest of the province are given. In all parts of the province, except for the Transkei and Ciskei, the hunting regulations list the blue wildebeest but not the black wildebeest. Blue wildebeest can be hunted throughout the year and have an unlimited bag limit. Blue wildebeest may also only occur on properties that have a CoAE (Eastern Cape (South Africa), 2017:33). In the Transkei and Ciskei, both the blue and black wildebeest are classified as protected game and permits are necessary for hunting, selling and trading wildebeest and other activities (Ciskei (South Africa), 1987:10,26-28; Transkei (South Africa), 1992:51).

3.5.5.3 North West province

Species that can potentially create hybrids are not allowed to be transported if they occurred in the same camp (North West (South Africa), 2013:34). Thus blue and black wildebeest hybrids may not be imported into the province and may not leave the province alive (North West (South Africa), 2013:34). Exempted farms are allowed to transport black and blue wildebeest to another exempted farm as the exemption permit act as a transport permit (North West (South Africa), 2013:26). The transport permit is necessary if black and blue wildebeest are to be captured, auctioned or transported under permit-conditions and which comply with animal welfare and SABS standards for the blue wildebeest (North West (South Africa), 2013:28). Any wildlife establishment that keeps black and blue wildebeest requires a 1.4 metre, 12-wire fence (North West (South Africa), 2010:40;12:33; North West (South Africa), 2014:22-24).

The North West Biodiversity Bill of 2015, which will replace the other legislation and be repealed if the North West Biodiversity Management Act (4 of 2016) is implemented, classifies the blue wildebeest as a specially protected species and the black wildebeest as an ordinary species that must be captured and conveyed with a movement register. Specific blue wildebeest hunting information is not given (North West (South Africa), 2016b:25,39,54,63). A hunting licence is necessary for landowners to hunt the species on their own farms. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July (North West (South Africa), 2017a:14-23).

3.5.5.4 Free State province

Capturing of the black wildebeest is only allowed on wildlife establishments that have a CoAE and on which the black wildebeest is specifically indicated on the certificate. No live relocation of black or blue wildebeest is allowed to or from areas where hybridisation is a risk (Tambling, *et al.*, 2016b:6).

The blue wildebeest is classified as an ordinary species in provincial legislation and can be hunted throughout the year if the wildlife establishment has a CoAE on which the species is mentioned. The black wildebeest is seen as a TOPS species and an additional permit is necessary to hunt the species unless the wildlife establishment is registered as a TOPS game farm or game capturer (Free State (South Africa), 2014:2). The Nature Conservation Ordinance (8 of 1969) and the Draft Free State Nature Conservation Bill of 2007 classifies the black and blue wildebeest as ordinary game which means that they may be hunted as per hunting regulations, if a permit is obtained or if a hunting licence is obtained or if the hunter does not hunt on a wildlife establishment of which he is the owner (Free State (South Africa), 1969:21-22,26; Free State (South Africa), 2007:10-11,52-53).

3.5.5.5 KwaZulu-Natal province

In the KwaZulu-Natal province, black and blue wildebeest species are not allowed to occur on the same property. Black wildebeest is a protected species in the KwaZulu-Natal province and the protected status leads to black wildebeest receiving preference if there is a choice to keep both types of wildebeest. Blue and black wildebeest species will only be sold to farms where there are no or only pure species if they are not a hybrid. The provincial government will also assist in the removal of hybrid species (KZN Wildlife, nd:1)

The KwaZulu-Natal Nature Conservation Management Amendment Act, 5 of 1999 classifies black wildebeest as protected indigenous animals which means they cannot be hunted, translocated, bought or sold without a permit. The blue wildebeest is not mentioned (KwaZulu-Natal (South Africa), 1999:16-24, 42). This is reiterated in provincial hunting legislation that classifies the blue wildebeest as a 'species of protected game' which can be hunted from 31 May to 31 August. A protected game permit is required by a landowner and a protected game licence by hunters hunting on the farm on which they are not the owner. Black wildebeest are listed as a TOPS species, but are also classified as a 'species of protected game'. The black wildebeest can also be hunted from 31 May to 31 August and requires a TOPS permit and an Ordinance Licence or permit depending on whether or not the hunter is the owner of the property (KwaZulu-Natal (South Africa), 2015:2).

3.5.5.6 Limpopo province

The blue wildebeest can be hunted in the open season, which is throughout the year. This open season is only applicable to hunters who hunt on their own wildlife establishment. If hunters hunt blue wildebeest on a farm of which they are not the owner, open season is from 1 May to 31 July (Limpopo (South Africa), 2017:12-18).

There are certain plots in Mokopane, Letaba, Polokwane and Blouberg municipal areas that are considered closed districts meaning that hunting may generally not take place there (Limpopo (South Africa), 2017:5). In the Limpopo National Environmental Management Act (7 of 2003) blue wildebeest are classified as 'game' and the black wildebeest as non-indigenous wild animals. This includes cross-breeds, colour variations and genetic variations (Limpopo (South Africa), 2003:15-16,47). Black Wildebeest is a TOPS species and needs a TOPS permit. Blue wildebeest requires a hunting permit if hunted on a non-exempted farm. Permission is needed by the landowner if the hunter hunt on an exempted farm of which he is not the landowner (Limpopo Hunters, 2017).

3.5.5.7 Mpumalanga province

The Mpumalanga Nature Conservation Act (10 of 1998:7) classifies the black wildebeest as protected game and the blue wildebeest as ordinary game. The Mpumalanga Hunting Proclamation states that the blue wildebeest, if hunted by persons other than the owners of the land, may only be hunted from 1 May to 31 July. The geographical area of the wildlife establishment must also be considered and is stipulated in the hunting proclamation (Mpumalanga (South Africa), 2017a:16-21).

3.5.5.8 Gauteng province

The Gauteng province Hunting Regulations do not mention blue or black wildebeest (Gauteng (South Africa), 2015). In the provincial conservation ordinance, the blue wildebeest is not mentioned and the black wildebeest is classified as protected game which means that black wildebeest is not allowed to be hunted unless a land permit is issued (Gauteng (South Africa), 1983: 6,37). The Gauteng Nature Conservation Bill of 2014 doesn't list species and their classifications and national legislative guidelines should be applied (Gauteng (South Africa), 2014:1-50).

3.5.5.9 Northern Cape province

The Northern Cape Nature's hunting regulations state that one blue and one black wildebeest can be hunted per person per day from 1 May to 31 August (Northern Cape

(South Africa), 2012:7). The blue and black wildebeest are listed as protected species, which means a permit is necessary to hunt, translocate, keep, possess, breed or trade the blue and black wildebeest. In addition, a hunting licence is necessary unless a game farm permit or permit to hunt a protected animal is issued (Northern Cape (South Africa), 2009:41,61,72).

Black wildebeest are popular amongst wildlife establishments that offer hunting, sales and meat (Tambling, *et al.*, 2016b:5).

3.5.5.10 Conclusion and comparison on provincial blue and black wildebeest legislation

Hybrids are not allowed to be imported into the Western Cape or North West provinces. To ensure this, a game management plan and habitat assessment must be done prior to translocation into the Western Cape. In the KwaZulu-Natal province, to avoid hybridisation, if there is a choice between keeping black and blue wildebeest, black wildebeest are given preference.

In the Western Cape, Eastern Cape and Free State provinces a CoAE is necessary to keep blue wildebeest. In the North West province an exemption permit will allow wildlife establishment owners to transport blue and black wildebeest to and from another exempted farm. Alternatively a transport permit is necessary.

Non-hybrid species require a 1.4 metre fence in the Western Cape and North West provinces. In the Western Cape province, if a blue wildebeest is kept next to a black wildebeest, the fence height should be increased to a 1.8 metre electrified fence or, alternatively, a double 1.8 metre fence.

In the Western Cape province, black and blue wildebeest can be hunted in unlimited numbers throughout the year. In the Eastern Cape province, blue wildebeest can be hunted throughout the year and have unlimited bag limits except in the Transkei and Ciskei where legislation indicates that permits are necessary for hunting and participation in other activities that involve wildebeest. In the Free State province, blue wildebeest can be hunted throughout the year if a CoAE is allocated to that farm. In the North West province, hunting permits or licences are necessary to hunt blue and black wildebeest. In the Limpopo province black wildebeest require a TOPS permit and blue wildebeest only a hunting permit if hunted on an exempted farm. Otherwise, only permission from the owner is necessary if hunted on a farm for which the hunter is not the owner. In the Mpumalanga province, if hunted on a game farm of which the hunter is not the owner, the hunt may only take place from 1 May to 31 July. In the Gauteng province, permits must be obtained to hunt blue or

black wildebeest. In the Northern Cape province a permit is needed for wildebeest activities and a bag limit of one blue and one black wildebeest per person per day is given which can only be hunted from 1 May to 31 August.

In the KwaZulu-Natal province, blue wildebeest can be hunted from 31 May to 31 August. In the Limpopo province, blue wildebeest can be hunted throughout the year by wildlife establishment owners. If hunters are not the owners, the hunt can take place from 1 May to 31 July. In the Limpopo province there are also certain farms on which hunting wildebeest may not occur.

The black wildebeest requires a permit since it is not mentioned in provincial Eastern Cape hunting legislation. In the KwaZulu-Natal province black wildebeest require a permit, unless the farm is registered as a TOPS game farm. Black wildebeest require a TOPS permit and Ordinance licence or permit.

3.5.6 Provincial zebra legislation

There are different species of zebra that, in some cases, have specific legislation attached to them. The three species are the Mountain Zebra (Cape mountain and Hartmann's Zebra subspecies), Plains or Burchell's zebra and Grevy's Zebra. The different zebra species have different popular land-uses.

Popular land-uses for Hartmann's zebra are live sales as well as by-products that include skin and meat (Novellie, *et al.*, 2016:5). In addition, Hartmann's zebra are popular for tourism, being sold at live auctions and for trophy hunting (Hrabar, *et al.*, 2016:7). The Plains zebra is popular amongst hunters because of skin, trophies and meat. This species is also extremely popular amongst exporters and breeders that breed colour variants (Stears, *et al.*, 2016:4-5). Although the Grevy's zebra prefer grassland and shrubs which are biomes found in South Africa, the Grevy's zebra is not found in South Africa (Rubenstein, *et al.*, 2018). The information below indicates the reasons for legislation and why wildlife establishment owners that keep these species should consider the specific provincial legislation in the area where their wildlife establishment is situated.

Plains zebra occur in abundance in private and public wildlife establishments across South Africa. The species occurs in the Limpopo, Mpumalanga Lowveld area, KwaZulu-Natal and Limpopo as well as in the Northern Cape and North West provinces. This species can adapt to most biomes with the exception of deserts and forests. Tropical and temperate climates are preferred (King & Moehlman, 2016:8-9; Stears, *et al.*, 2016:2-5). Plains zebra enjoy the same forage as cattle and the encroachment of cattle farms are one threat to the Plains

zebra. The species is highly dependent on water and areas prone to drought and climate change that reduce rainfall is also seen as a threat (Stears, *et al.*, 2016:4).

Hartmann's zebra prefer rugged, mountainous and escarpment areas. This species appear especially within the northern parts of South Africa, close to Namibia in the Northern Cape (Novellie, *et al.*, 2016:4). The numbers of Hartmann's zebra are increasing, but threats and the reason for legislation stem from the need to prevent hybridisation, especially with the Cape Mountain zebra. The hybridisation is more a threat for the Cape Mountain zebra whose numbers and genetic diversity is of a greater threat than that of the Hartmann's zebra (Novellie, *et al.*, 2016:2-5).

The Cape mountain zebra prefer the habitats found in the Eastern Cape, Western Cape and parts of the Northern Cape provinces. Nama and Succulent Karoo habitats, fynbos and grassland are favourable biomes within these provinces (Scientific Authority of South Africa, 2015:1; Hrabar, *et al.*, 2016:1). Threats and the reasons for species-specific legislation are poor genetics because of inbreeding as well as hybridisation with the Plains zebra and Hartmann's zebra. These threats stem from excessive hunting and agricultural farming that replaced natural habitats. (Birss, *et al.*, 2016:25-26; Hrabar, *et al.*, 2016:1-3,7-8; Novellie, *et al.*, 2002:35-38). The aim of provincial legislation is to prevent hybridisation and to ensure that translocation of these species do not occur outside their natural distribution range (Novellie, *et al.*, 2002:35-38).

3.5.6.1 Western Cape province

Translocation and the introduction of new species should allow for a herd size of twelve to fourteen animals. In addition, translocation regulations and veterinary requirements should be followed; the correct permits should be obtained and a suitable habitat within the natural distribution area must be identified. Plains Zebra involve less control and require veterinary and fencing requirements to be considered. Hybridisation should also be avoided and to encourage this, no new Hartmann's Mountain Zebra may be introduced into the Western Cape (Western Cape Nature Conservation Board, 2015:12).

Before Hartmann's and Cape mountain zebra species can be imported, a game management plan must be provided and a habitat assessment be done (Western Cape Nature Conservation Board, 2010:7). No hybrid species will be allowed to be imported into the province (Western Cape Nature Conservation Board, 2010:8). On wildlife establishments where zebra are allowed to be kept a 1.4 metre fence is needed for any species of zebra (Western Cape Nature Conservation Board, 2015:16;8:12-17).

In the Western Cape Nature Conservation Laws amendment Act of 2000, the Cape Mountain zebra is listed as an endangered wild animal which means it cannot be owned or hunted without a permit or licence. The exception to this rule is if the owners hunt on their own property. The Plains and Hartmann's zebra are protected wild animals and to own or hunt such species a CoAE is necessary (Western Cape (South Africa); 2000:88-91). Plains zebra can be hunted throughout the year in unlimited numbers (Western Cape (South Africa), 2013:3037).

3.5.6.2 Eastern Cape province

To help ensure good quality genes, translocations are made (Hrabar & Kerley, 2015:8). The main reason for translocating the Cape mountain zebra is to ensure the growth of the species (Department of Environmental Affairs, 2015a:11). To help prevent hybridisation, all Cape mountain zebra sub-populations occur in fenced areas (Hrabar & Kerley, 2015:8). Hybridisation between the Cape mountain zebra and the Hartmann's zebra is low as Hartmann's Zebra were removed. There are hybrid species in the Eastern Cape and the Eastern Cape is in the process of outbreeding the Hartmann's zebra. DNA testing is necessary for translocation to avoid hybrid species being spread to other regions (Hrabar & Kerley, 2015:13).

In the Eastern Cape province, the hunting regulations are for the Ciskei, Transkei and the rest of the province. The Ciskei doesn't mention the zebra, and in the Transkei, there is no specified hunting season. Hunting in the Transkei can take place if the hunter has a permit (Eastern Cape (South Africa), 2017:33-39). In the Transkei and Ciskei provincial environmental legislation, the Cape mountain and Plains zebra are classified as protected game and permits are necessary for hunting, selling, trading and other activities (Ciskei (South Africa), 1987:26-28; Transkei (South Africa), 1992:51).

3.5.6.3 North West province

Cape mountain zebra are not allowed in the Northern Cape province because it is the natural distribution range of the Hartmann's zebra and not the Cape mountain zebra. Combining the two species may involve an unsuitable habitat and lead to hybridisation or poor genetics (Novellie, *et al.*, 2002:35-38). The Cape mountain zebra is therefore seen as an indigenous alien species in the North West province and import may only be allowed to enhance genetic diversity amongst existing populations (North West, (South Africa), 2013:33-34). To prevent hybridisation, any species, such as Hartmann's and Plains zebra that can potentially create hybrids are not allowed to be transported if they occurred in the same camp (North West (South Africa), 2013:34). New species will only be allowed into the

North West province to supplement existing populations of the Hartmann's and Cape mountain zebra (North West (South Africa), 2010:34). In addition, any wildlife establishment that has a Hartmann's zebra requires a 1.8 metre fence with 15-wire strands (North West (South Africa), 2010:40;12:33). Exempted farms are allowed to transport animals to another exempted farms as the exemption permit acts as a transport permit (North West (South Africa), 2013:26).

The North West Biodiversity Bill of 2015, which will replace the other mentioned legislation if approved, classifies the Plains zebra as a specially protected species which implies that permits are necessary for any activity. The Plains zebra is a species that is an ordinary species that can be captured and conveyed by means of a game movement register (North West (South Africa), 2016b:25,39,54,63). A hunting licence is necessary for landowners to hunt the species on their own farms. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July (North West (South Africa), 2017a:14-23).

3.5.6.4 Free State province

The Nature Conservation Ordinance (8 of 1969) classifies the zebra as ordinary game which means that the species can be hunted as per hunting regulations with a permit or hunting licence if the hunter is not hunting on a farm of which he/she is the owner (Free State (South Africa), 1969:10-11;21-22,26). The Plains Zebra is classified as an ordinary species in provincial legislation and can be hunted throughout the year if the wildlife establishment has a CoAE on which Plains zebra is mentioned. If not, hunting can only occur between 1 April and 30 September. The Hartmann's zebra is seen as a TOPS species and can only be hunted or captured if the wildlife establishment is registered as a TOPS game farm or game capturer. Capturing can only occur between 1 March and 31 October if the game farm is not registered as a TOPS game farm or game capturer. The zebra, in general, is seen as a TOPS species and an additional permit is necessary to hunt the species unless the wildlife establishment is registered as a TOPS game farm or game capturer (Free State Province (South Africa), 2014:2-6).

3.5.6.5 KwaZulu-Natal province

No zebra is mentioned in provincial environmental legislation (KwaZulu-Natal (South Africa), 1999:42). According to the KwaZulu-Natal province Hunting regulations the Plains zebra is classified as a species of protected game and can be hunted between 31 May and 31 August. The protected game permit is required by a landowner that hunts on his own farm

and a protected game licence if the hunter is not the owner of the land on which the hunt takes place. The Cape mountain zebra is not mentioned – probably because it is outside the natural distribution range (KwaZulu-Natal (South Africa), 2015:2).

3.5.6.6 Limpopo province

In the Limpopo National Environmental Management Act (7 of 2003) the Plains zebra is classified as game and the mountain zebra as a non-indigenous wild animal (Limpopo (South Africa), 2003:46-48). Wildlife establishments must be exempted to have and hunt the species and if exempted require permission from the landowner to hunt if the hunter is not the owner. A hunting permit is necessary if the hunter is not the owner of the farm. Cape mountain zebra are not allowed to be exported to the United States and require a CITES and TOPS permit because they are listed on CITES Appendix 1 and as a TOPS species in South Africa. The Hartmann's zebra is listed on CITES Appendix 2 and require a CITES permit if exported internationally (Limpopo Hunters, 2017).

3.5.6.7 Mpumalanga province

The Mpumalanga Nature Conservation Act (10 of 1998:7) classifies the mountain and Hartmann's zebra as protected game and the Plains zebra as ordinary game. Zebra is not mentioned in the provincial hunting regulations and a permit is necessary if zebra species wants to be hunted (Mpumalanga (South Africa), 2017:18-38).

3.5.6.8 Gauteng province

The Gauteng province Hunting Regulations of 30 March 2015 does not mention zebra (Gauteng (South Africa), 2015). In the Nature Conservation Ordinance 12 of 1983 the Hartmann's and mountain zebra are classified as protected game which means that these zebra species are not allowed to be hunted unless a land permit is issued (Gauteng, 1983:6,37). Such a list is not found in the Gauteng Nature Conservation Bill of 2014 and national legislation should then be considered (Gauteng (South Africa), 2014:1-50).

3.5.6.9 Northern Cape province

The Northern Cape Nature's hunting regulation mentions that one Plains zebra and one Hartmann's zebra can be hunted from 1 May to 31 August per person per day (Northern Cape (South Africa), 2012:5-7). In the Northern Cape Nature Conservation Act (9 of 2009) the Plains zebra is listed as a protected species which means a permit is necessary to hunt, translocate, keep, possess, breed or trade this zebra species. In addition, a hunting licence is necessary unless a game farm permit or permit to hunt a protected animal is issued. The

Cape mountain and Plains zebra are classified as specially protected species which means a permit is necessary to hunt, breed, trade, capture or translocate these animals (Northern Cape (South Africa), 2009:41,61,72).

3.5.6.10 Conclusion and comparison on provincial zebra legislation

In the Western Cape, a 1.4 metre fence is required for any species of zebra. In the North West province a 1.8 metre fence is necessary for zebra.

In the Western Cape, translocating a Cape mountain zebra has prerequisites such as permits, natural distribution area, suitable habitat and fencing requirements. Hybrids are not allowed into the province. In the Eastern Cape, translocation involves DNA testing to prevent hybrids from being translocated. Cape mountain zebra is not allowed to be translocated into the North West province as it occurs outside the natural distribution range of the Cape mountain zebra, but inside the natural distribution range of the Hartmann's zebra. Cape mountain zebra are only allowed in the North West province to enhance genetic diversity of existing zebra in the province.

In the Western Cape, Eastern Cape, Mpumalanga and Gauteng provinces, a permit is necessary to own or hunt a zebra. In general, in the Free State province, a permit is needed by hunters who hunt on farms where they are not the owner. If the owner, a hunting licence must be obtained prior to the hunt. The Cape mountain zebra is not allowed to be exported to the United States and, if exported to other countries, a CITES permit is necessary. The Limpopo province specifically states that a TOPS permit is necessary and a CITES permit if transporting zebra internationally.

In the Western Cape, a CoAE is necessary to own or hunt a Plains or Hartmann's zebra. In the Northern Cape one Plains and one Hartmann's zebra can be hunted per person from 1 May to 31 August. A permit is necessary for any activity that involves a zebra.

In the Free State province, the Burchell's zebra can be hunted throughout the year if on a farm that has a CoAE. If the hunt takes place on a farm that does not have a CoAE, the hunt can take place between 1 April and 30 September. In the KwaZulu-Natal province, a permit is needed to hunt a Plains zebra between 31 May and 31 August.

The Hartmann's zebra can be hunted on a TOPS game farm throughout the year or captured between 1 March and 30 October if the farm is not registered as a TOPS game farm. In the Limpopo province wildlife establishment must be exempted to keep zebra.

A Plains zebra can be hunted throughout the year in unlimited numbers in the Western Cape province. In the North West province, Plains zebra require permits and can be translocated by means of a movement register.

3.5.7 PROVINCIAL ROAN AND SABLE LEGISLATION

Roan antelope favour savannah woodland and grassland biomes. Provinces in which the roan occur are Limpopo, parts of Mpumalanga, the North West province, Northern Cape and Free State provinces (IUCN SSC Antelope Specialist Group, 2017:1-4; Kruger, *et al.*, 2016:1). The lack of habitat has caused migration amongst other roan sub-species which created a risk of hybridisation (Kruger, *et al.*, 2016:1).

Sable prefer savannah woodland and grasslands and provinces where the sable are found include Mpumalanga, Northern Limpopo and the North West provinces. Outside the natural distribution range, the sable is found in the Western Cape, Eastern Cape, Free State and KwaZulu-Natal provinces (IUCN SSC Antelope Specialist Group, 2016:4; Parrini, *et al.* 2016:1-3).

Motivation for legislation stems from habitat degradation, partly because of agricultural development and cattle farming that competes for grazing in the same habitat. Climate change can cause habitat threats in the future. Another threat is translocations to unsuitable habitats (Parrini, *et al.*, 2016:1,5-7).

3.5.7.1 Western Cape province

Before sable and roan species can be imported, a game management plan must be provided and a habitat assessment be done as hybrid species will be allowed to be imported into the province (Western Cape Nature Conservation Board, 2010:7-8). Fencing regulations for properties that do keep these species state that a 1.8 metre visible fenced is needed (Western Cape Nature Conservation Board, 2015:8-11).

In the Western Cape Nature Conservation Laws amendment Act of 2000 and the Western Cape Nature Conservation Board Implementation Guidelines for bow-hunting in the Western Cape Province: December 2011, neither roan nor sable are mentioned (Western Cape 2000:88-92; Western Cape Nature Conservation Board, 2011:2-6).

3.5.7.2 Eastern Cape province

In the Eastern Cape province, roan and sable are not mentioned in any provincial legislation. Permits are therefore necessary as per national legislation (Ciskei (South Africa), 1987:26-28; Eastern Cape (South Africa), 2017:31-37; Transkei (South Africa), 1992:51).

3.5.7.3 North West province

The western and southern roan can potentially create hybrids and are not allowed to be transported if they occurred in the same camp (North West (South Africa), 2013:34). Western and southern or any other Hybrid species may not be imported into the province and may not leave the province alive (North West (South Africa), 2013:34). To prevent such hybridisation, fencing regulations require any wildlife establishment that has roan or sable to have a 1.8 metre fence with 15-wire strands (North West (South Africa), 2010:40;12:33; North West (South Africa), 2014:22-24).

In the North West province, the sable is seen as a protected species and the roan is not mentioned. Permits are therefore needed for activities such as to hunt, buy, sell or transport these two species (North West Biodiversity Bill of 2015:25,39,54,63; Bophuthatswana (South Africa),1973:5,21-22). A hunting licence is necessary for landowners to hunt the species on their own farms. If not the owner, a permit is necessary. If the farm is exempted, hunting can occur throughout the year. If not exempted the hunt can occur between 1 May and 31 July by means of a permit (North West (South Africa), 2017:14-23).

3.5.7.4 Free State province

In the Nature Conservation Ordinance (8 of 1969) the sable is classified as protected game and the roan is not mentioned (Free State (South Africa), 1969:21-22,26). In provincial hunting regulations, roan is classified as an ordinary species and can be hunted throughout the year unless the wildlife establishment is registered as a TOPS game farm or game capturer then hunting can occur throughout the year. Capturing can only occur between 1 March and 31 October unless a permit indicates otherwise (Free State Province (South Africa), 2014:2-6).

3.5.7.5 KwaZulu-Natal province

According to the KwaZulu-Natal province Hunting Proclamation (page 2) the sable is classified as a species of protected game and can be hunted between 31 May and 31 August. A protected game permit is required by a landowner that hunts on his own farm and

a protected game licence if the hunter is not the owner of the land on which the hunt takes place.

The roan is classified as a species of specially protected game and there is no hunting season given. A specially protected game permit is necessary which indicates the number of species that is allowed to be hunted and when. The roan is also considered a TOPS species and an integrated permit and ordinance permit is required to hunt it (KwaZulu-Natal, 2015:2).

3.5.7.6 Limpopo province

Roans and sables are not mentioned in the Limpopo province hunting regulations which are closed farms on (Limpopo (South Africa), 2017:1-6). In the Limpopo National Environmental Management Act (7 of 2003) the roan is classified as a specially protected wild animal and the sable as a protected wild animal (Limpopo (South Africa), 2003:43-47; Limpopo (South Africa), 2017:12-18). Roan require a TOPS permit to be hunted. Sable can be hunted on exempted farms, but a CITES permit is necessary if hunting takes place on a non-exempted farm (Limpopo Hunters 2017). When these species are hunted, care should be taken of the geographical location on which the hunt takes place as some farms are considered 'closed farms' and hunting may not be allowed (Limpopo (South Africa), 2017:1-6).

3.5.7.7 Mpumalanga province

The Mpumalanga province hunting regulations do not mention the sable and roan (Mpumalanga (South Africa), 2017:18-38). The Mpumalanga Nature Conservation Act (10 of 1998:7) classifies the sable and roan as protected game which implies permits are necessary for activities that involve these species.

3.5.7.8 Gauteng province

The Gauteng province Hunting Regulations do not mention sable and roan (Gauteng (South Africa), 2015:1-50). In the Nature Conservation Ordinance 12 of 1983 the roan and sable were classified as protected game which means that roan and sable species are not allowed to be hunted unless a land permit is issued (Gauteng, (South Africa), 1983:6,37). In the Gauteng Nature Conservation Bill of 2014 roan and sable are not listed which implies that permits are necessary for activities that involve these species (Gauteng (South Africa), 2014:1-50).

3.5.7.9 Northern Cape province

The Northern Cape province hunting regulations do not mention the roan and sable (Northern Cape (South Africa), 2012:5-7). In the Northern Cape Nature Conservation Act (9 of 2009) the roan and sable are listed as protected species, which means a permit is necessary to hunt, translocate, keep, possess, breed or trade the sable and roan (Northern Cape (South Africa), 2009:41,61,72).

Roan and sable antelopes are favoured for intensive breeding, game sales and trophy and biltong hunting (Kruger, et al., 2016:4; Parrini, *et al.*, 2016:1).

3.5.7.10 Conclusion and comparison on provincial sable and roan legislation

In the Western Cape and North West province a 1.8 metre fence is necessary for sable and roan. These are the only two provinces that give specific regulation concerning fencing.

A game management plan and habitat assessment are necessary for all newly translocated sable and roan in the Western Cape province. Hybrid species are not allowed to be imported into the North West province.

Permits are required to hunt these species as they are not mentioned in provincial Western Cape, Eastern Cape, North West, Free State, Mpumalanga, Gauteng and Northern Cape provinces' regulations. In the Free State, if the game farm is registered as a TOPS game farm or capturer, hunting and capturing can occur throughout the year. If not, hunting and capturing can only occur from 1 March to 31 October. In the KwaZulu-Natal province, sable can only be hunted between 31 May and 31 August. The permit or licence necessary differs depending on whether or not the hunter hunts on the land of which he is the owner. In the Limpopo province, roan require a TOPS permit and sable a CITES permit if hunted on a non-exempted farm.

3.6 CONCLUSION

The aim of this chapter was to discuss the national and, specifically, the provincial legislation that impacts the private wildlife industry directly. The first discussion focused on national legislation in which the various legislation was categorised and listed. The five categories were land affairs, employees, the natural environment, animal health and agriculture related legislation. The next discussion focused on hunting legislation or proclamations and species classification within the hunting legislation. This section focused on how different provinces' hunting legislation and proclamations differ, how the hunting legislation classifies different species and how different species' classification impact the hunting of different species. The

last discussion focused on how various provincial legislation for different species differs and was indicated by referring to hybridisation, translocation, fencing, permits and hunting regulations. The species included bontebok and blesbok, zebra, black and blue wildebeest, buffalo, predators, roan and sable.

In the next chapter the environmental conditions, diseases of species and climate change will be discussed.

CHAPTER 4

BIOMES, DISEASES AND CLIMATE CHANGE

4.1 INTRODUCTION

The four pillars of the game industry and legislation have been discussed. Decisions that relate to these pillars are guided by the natural environment in which privately owned game farm owners are situated. The aim of this chapter is to discuss the biomes of South Africa, animal diseases and the climate. In total, this chapter is divided into five sections. The sections are shown in the figure below, after which the sections will be discussed as they relate to the private wildlife industry in South Africa.

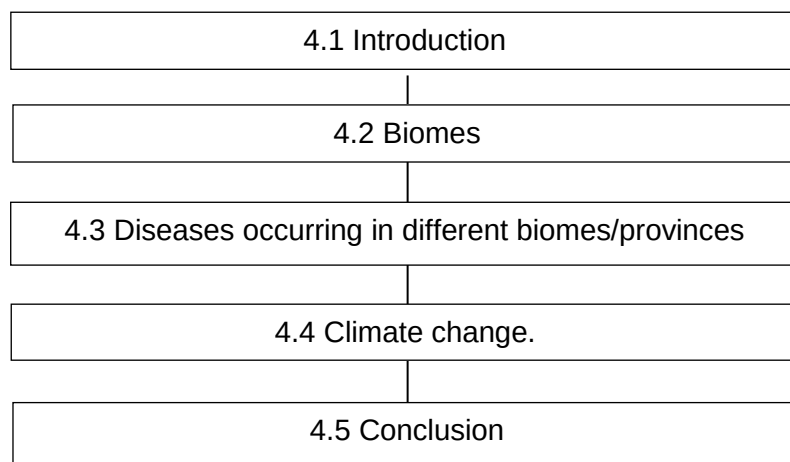


Figure 4.1: Chapter layout

4.2 BIOMES

Biomes are classified according to plants and animals that occur in areas that have different vegetation, temperatures, sunlight, and soil characteristics and receive a certain amount of water (National Geographic, 2016; Moncrieff, *et al.*, 2015:325-326). South Africa has nine biomes upon which humans and animals depend for survival. Humans develop and offer activities within the biomes, such as tourism and hunting, that should not jeopardise the sustainability of the animals that live in a specific biome (DEA, 2013:3,8,13; Fourie, *et al.*, 2015:67-68). The nine biomes discussed below are the Savannah, Albany Thicket, Fynbos, Desert, Forest, Grassland, Nama Karoo, Succulent Karoo and Indian Ocean Coastal Belt (DEA, 2013:3,8,13). The map below indicates the areas where the biomes are located in South Africa.

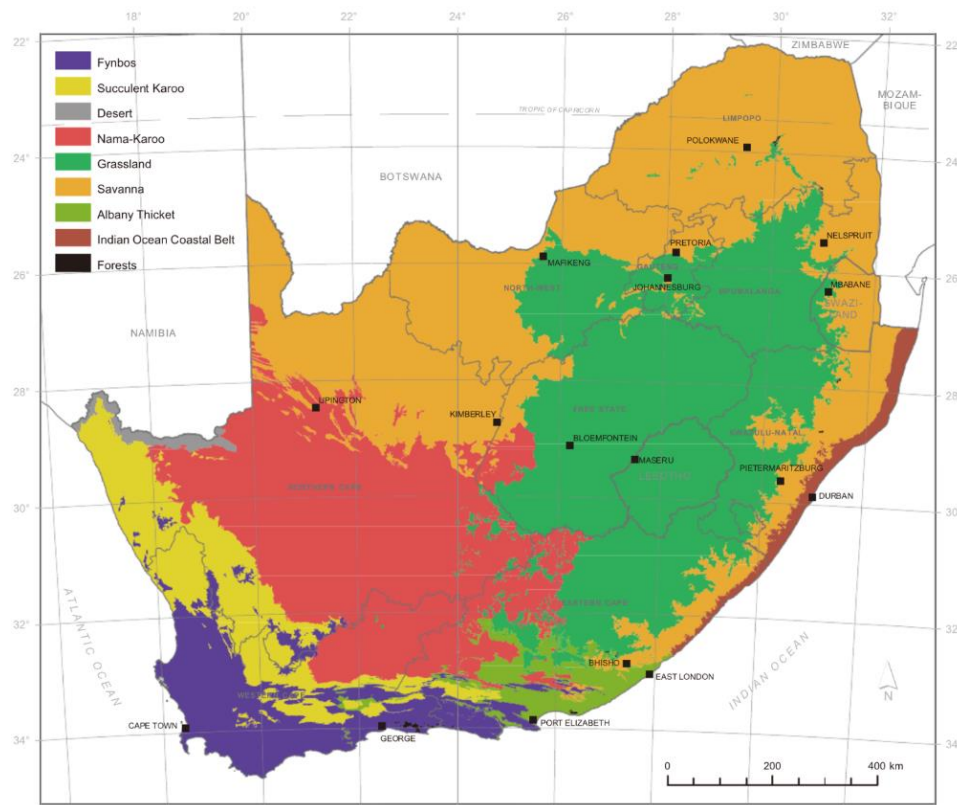


Figure 4.2: Map of biomes in South Africa

Source: Rutherford, et al., 2006:31)

The map allocates different colours to different biomes – purple for Fynbos, yellow for Succulent Karoo, Pink for Nama Karoo, Grey for Desert, dark green for Grassland, orange for Savannah, light green for Albany Thicket, brown for Indian Coastal Belt and black for Forests. The map gives a clear indication where the biomes border each other. In certain cases, the boundaries between biomes may be sharp, such as indicated on the map, and the change between biomes occurs within 10 metres. An example of two biomes sharing a sharp boundary is the Fynbos (purple) and Succulent Karoo Biome (yellow). In other occurrences the boundaries may be more intermediate and the change between biomes occur over a few kilometres. An example is between the Succulent (yellow) and Nama Karoo (pink) biome (Rutherford, *et al.*, 2006:31). The map also indicates the nine provinces of South Africa and shows that biomes are not province-specific, but rather region-specific. Thus one biome can occur in more than one province and one province may contain more than one biome. Table 4.1 provides a summary of the biomes of South Africa. Although this study aims to give guidelines for private game farm owners and managers per province, this is difficult as biomes are not specific to one province.

Table 4.1: Biome, climate, vegetation and animal comparison

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERRED ANIMALS
Savanna	- Northern Cape - North West - Limpopo - Mpumalanga - KwaZulu-Natal and - Eastern Cape	- Summer rainfall can vary from 235-1 000mm depending on area - Average temperature: 20°C - Approximately 9 frost days - Annual Evaporation: 2 393mm - Soil moisture stress: 80% of days evaporation demand was more than double soil moisture supply	- Woody plants and grasses (1-3m tall) - Woody plants and bush encroaching (seasonal trees and shrubs) + grasses and forbs - Good for livestock - Rain and temperature allow for variance between sour and sweet veld - Fires may be necessary depending on rainfall and influence plant height - Fires are said to increase woody encroachment that is evident in communal areas	African buffalo, blesbok, blue wildebeest, blue duiker, Burchell's zebra, bushbuck, bushpig, eland elephant, gemsbok in certain regions, giraffe, greater kudu, grey duiker, grey rhebok, hippopotamus, impala, klipspringer, mountain reedbuck, nyala, oribi, red duiker, red hartebeest, roan antelope, sable antelope, Sharpe's grysbok, springbok, steenbok, suni, warthog, waterbuck and white rhinoceros

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERRED ANIMALS
Albany Thicket	• Eastern Cape	• Unpredictable summer rainfall of 200-1 000mm • Average temperature: 17.2°C • Approximately 9 frost days • Annual Evaporation: 2 025mm • Soil moisture stress: 77% of days evaporation demand was more than double soil moisture supply.	• Trees and shrubs (1/2-3m tall) • Dense vegetation • Rain and fire prevent tree development	African savanna buffalo, blue duiker, bushbuck, bushpig, Cape grysbok, elephant, greater kudu, grey duiker, klipspringer, red duiker and traditionally the black rhinoceros, nyala, red hartebeest, Sharpe's grysbok, warthog and waterbuck.
Desert	• Northern Cape	• Low and variable summer rainfall (10-70mm rain) • Drought, dry and arid	• Low soil moisture • Sandy soil	Black rhinoceros, blue wildebeest, Burchell's zebra, eland, gemsbok, giraffe, greater kudu, grey duiker, klipspringer, ostrich, red hartebeest, springbok, steenbok and warthog

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERRED ANIMALS
Fynbos	• Eastern Cape • Western Cape	• 210-800 or up to 2 000mm rain in winter depending on geographic area • Dry summers • Average temperature: 15.7°C • Approximately 14 frost days • Annual Evaporation: 2 047mm • Soil moisture stress: 72% of days evaporation demand more than double soil moisture supply.	• Few trees • Fires are necessary	Bontebok, Cape grysbok, grey duiker, grey rhebok, klipspringer, steenbok is currently found and traditionally the black rhinoceros, bushbuck, Cape mountain zebra, eland, hippopotamus, ostrich, red hartebeest and springbok were found

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERRED ANIMALS
Succulent Karoo	- Northern Cape - Western Cape - Eastern Cape	- Low winter rainfall (100-290mm) - Semi-arid climate with an average temperature: 16.8°C - Approximately 16 frost days - Annual Evaporation: 2 516mm - Soil moisture stress: 81% of days evaporation demand was more than double soil moisture supply	- Grass cover (limited time of the year) - Shrubs of less than ½ - 1½ m tall - Many rare species - Few alien species - Vegetation ideal for ecotourism and small stock (sheep, ostrich and goats)	Cape grysbok, gemsbok, klipspringer, springbok and steenbok and traditionally the Cape mountain zebra
Forests	- Western Cape - Eastern Cape	- Year-round rainfall (avg 525mm in winter and avg 725mm in summer) - Average temperature: 17°C - Approximately 0 frost days - Annual Evaporation: 1 739mm Soil moisture stress: Low due to little sun reaching bottom layer of vegetation.	Multiple layers of vegetation and evergreen trees Poor ground cover	Blue duiker, bushbuck, bushpig, elephant, grey duiker and red duiker

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERED ANIMALS
IOCB	• KwaZulu-Natal • Eastern Cape	• Year-round range that averages 1 272mm • Average temperature: 20°C • Approximately 0 frost days • Annual Evaporation: 1 737mm • Soil moisture stress: 66% of days evaporation demand was more than double soil moisture supply.	• Dunes, grassy planes • High soil moisture	Hippo, blue duiker and red duiker

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERRED ANIMALS
Grassland	• Mpumalanga • Free State • Gauteng • North West • Eastern Cape • KwaZulu-Natal	• Summer rainfall varies depending on region between 400 and 1 200mm per year • Frost and snow in some areas • Average temperature: 14.7°C • Approximately 40 frost days • Annual Evaporation: 1991mm • Soil moisture stress: 75% of days evaporation demand was more than double soil moisture supply.	• Flat plains, single grass layer • Sweet and sour veld • Varying soil types depending on area, e.g. acid soils in sour veld	Bushpigs, gemsbok, oribi, red hartebeest, sable antelope, springbok, steenbok, tsessebe, warthog, waterbuck and white rhino.

BIOME	PROVINCE	CLIMATE	VEGETATION	SOME PREFERRED ANIMALS
Nama Karoo	• Northern Cape • Western Cape • Eastern Cape	• Summer rainfall (60-520mm) • Average temperature: 16.8°C • Approximately 35 frost days • Annual Evaporation: 2 583mm • Soil moisture stress: 84% of days evaporation demand was more than double soil moisture supply	• Sandy soils • Mixture of dwarf shrubs, shrubs and perennial grasses. Ample grass due to summer rainfall • Winter: dwarf shrubs keep protein content = excellent forage • Western part = woody encroachment is increasing • Good for livestock – sheep and goats	Cape mountain zebra, gemsbok, klipspringer, ostrich, springbok and steenbok and traditionally the red hartebeest, greater kudu, eland, Cape grysbok, blesbok, black wildebeest and black rhinoceros

(Authors own creation) Source: Rutherford, *et al.*, 2006:37-39; DEA, 2013:18; UConn, 2016:2; Moncrieff, *et al.*, 2015:325-326, Bothma & du Toit, 2016:42

A game farm's location and biome will impact its land-use as certain animals require specific vegetation and survive better in specific climatic conditions. The detailed description below summarises each biome, the animals best suited for the biome and the climatic conditions that are associated the biome. Specific details on how land-use is affected by each biome is also described.

4.2.1 Savanna

The Savanna biome is South Africa's largest biome and covers approximately one third of South Africa's geographical area (Quintin, 2010; Rutherford, *et al.*, 2006:37-39). That equates to 400 000km² (DEA, 2013:3,8,13). The biome is represented by orange on the map and occurs in the northern part of the Northern Cape province, the North West, Limpopo, Mpumalanga, Kwa-Zulu-Natal and the Eastern Cape provinces (Rutherford, *et al.*, 2006:31). The biome lends itself well to nature-based tourism, hunting and livestock farming (Department of Environmental Affairs, 2015b:39). The biome borders mostly the Grassland biome and the Nama Karoo biome in the Northern Cape while small areas border the Albany Thicket in the Eastern Cape province (Khavhagali, 2010:14, Rutherford, *et al.*, 2006:31). The area is suitable for tourism, agriculture and livestock and game that are grazers (DEA, 2013:18; UConn, 2016:2). The large area of the Savanna biome allows it to be influenced differently by different climatic conditions that occur in different geographical areas within the biome (Moncrieff, *et al.*, 2015:325-326).

The Savanna biome can include sweet, mixed and sour veld that influence the type of vegetation and the type of animals that graze. Sweet veld that has clay soil generally occurs in low lying and semi-arid areas that get 200 to 500mm of rain. The plant species are seen as palatable and nutritional throughout the year as they keep their palatability and nutrients year round. The continuous palatability and nutrients of plants allow for animals to be in a good and healthy condition throughout the year (Bothma & du Toit, 2016:814). The sour veld occurs in high lying areas and is synonymous with tall grass and sandy soil that have a low pH and calcium, protein and phosphorus deficiencies (UConn, 2015). Unlike low-lying areas, the plants lose their palatability and nutrients when they reach maturity that influences the condition of animals if not properly managed (Bothma & du Toit, 2016:814). In between the low-lying sweet veld and high lying sour veld there is a transitional area called mixed veld. Mixed veld offers good grazing opportunities, especially if a wildlife ranch manager is knowledgeable on the nutritional value necessary for grazing (Bothma & du Toit, 2016:814). The fact that the biome is suitable for grazers will influence the type of animals kept on game farms. In certain areas, depending on whether there is sour veld or sweet veld, game farm managers must consider whether the nutrients available from plants are sufficient or whether additional feed is necessary.

The biome is located at an altitude of between 0m and 2 000m above sea level that cause different areas within the biome to receive different amounts of rain. However, typically between 235mm and 1000mm of rain is received in summer and low rainfall prevents tall trees from developing (UConn, 2016:2). Savanna biomes can be divided into stable and unstable biomes that depend on whether the biome occurs in an area where there is more or less than 650mm of rain. An area that receives less than 650mm of rain is seen as stable and does not require fire to open the canopy. The opposite is true for areas that receive more than 650mm of rain due to rain increasing woody cover (Devine, *et al.*, 2015:473). The average annual temperatures is 20°C with, on average, 9 frost days. Evaporation is approximately 2 393mm per year and soil receives stress on approximately 321 days when the evaporation demand is more than double the moisture that the soil is able to supply. The soil therefore has low moisture levels, especially in winter (Rutherford, *et al.*, 2006:37-40). Generally, the biome involves woody plants and grasses that grow between 1m and 20m tall (UConn, 2016:2). Grass fuels fire and, even though plant species are resistant to fires, the intensity and frequency of fires hinder the heights of plants and prevent trees from sprouting and grow above the fire zone (Devine, *et al.*, 2015:474; UConn, 2016:2).

Rainfall will also influence management activities. If a lot of rain is received, additional water does not need to be provided for animals. However, burning will then be necessary to open the woody cover. However, little rain will not require burning but may lead to artificial water sources being required for animals.

Artificial water sources will influence land-use and management activities further as certain animals prefer natural water sources as opposed to artificial water sources. In open Savannas, African savanna buffalo are water dependent and prefer about 31 litres of water from natural and artificial sources during the day and night. Blue wildebeest are also water dependent and prefer about 7 litres of water from natural sources during the day. Eland are water dependent to a lesser extent and prefer about 23 litres of water from natural sources during the day and night. Gemsbok are not water dependent and prefer about 9 litres of water from natural sources during the day. Greater kudu are not water dependent and prefer about 9 litres of water from natural sources during the day and night. Impala are water dependent and prefer about 2.5 litres of water from natural sources during the day. Red hartebeest are water dependent and prefer about 5.5 litres of water from natural sources during the day. Roan antelope are water dependent and prefer about 10 litres of water from natural sources during the day. Sable antelope and waterbuck are water dependent and prefer about 9 litres of water from natural sources during the day (Bothma & du Toit, 2016:42).

The African savanna buffalo and roan antelope also prefer tall grasses together with the Sharpe's grysbok (that is water dependent) and the steenbok that is not water dependent. The oribi (not water dependent) and the blesbok (water dependent) occur in the highveld grassland area. Blesbok prefer about 3 litres of water from natural sources during the day. Shade is preferred by the African savanna buffalo, blue wildebeest, grey duiker and tsessebe prefer water from natural sources during the day. Grey duiker prefer 1 litre of water and are not water dependent while tsessebe are water dependent and prefer 5 litres of water (Bothma & du Toit, 2016:).

National Parks help with the conservation and 50% of the biome is well conserved. Approximately 5% is within reserves while a large percentage is used for game viewing and hunting that should incorporate conservation (UConn, 2016:2). The large area of the Savannah biomes also allow it to be suitable for a wide variety of wildlife species (Quintin, 2010). Herbivores currently and traditionally found in this biome include the African savanna buffalo, blesbok, blue wildebeest, blue duiker, Burchell's zebra, bushbuck, bushpig, eland elephant, gemsbok in certain regions, giraffe, greater kudu, grey duiker, grey rhebok, hippopotamus, impala, klipspringer, mountain reedbuck, nyala, oribi, red duiker, red hartebeest, roan antelope, sable antelope, Sharpe's grysbok, springbok in certain areas, steenbok, suni, tsessebe in certain areas, the warthog, waterbuck and white rhinoceros. Traditionally, black rhinoceros were found, black wildebeest in certain areas, grysbok in areas they are not found today, nyala and oribi and red duiker and Sharpe's grysbok and tsessebe in the biome. Certain animal species, although they occur in parts of the biome, are not found in other parts of the biome (Bothma & du Toit, 2016:42). Certain vegetation that describes the animals' habitat are synonymous or integrated with other habitats allowing animals to be able to survive in other biomes.

Areas with short grasses are preferred by blue wildebeest, Burchells zebra, oribi, springbok, warthog and white rhino. all these herbivores are water dependent except for the oribi. The bushbuck, gemsbok, grey rhebok, nyala, roan and sable antelope, Sharpe's grysbok and suni also prefer shrubs (Bothma & du Toit, 2016:).

Arid Savanna is preferred by the eland, giraffe and suni while dense Savanna is preferred by the greater kudu. Woodland areas are suitable for the grey duiker while rocky terrain is suitable for the greater kudu, klipspringer and the mountain rhebok. The klipspringer and mountain zebra also prefer mountains (Bothma & du Toit, 2016:). Floodplains and wetlands are preferred by the oribi, warthog and waterbuck (Bothma & du Toit, 2016:).

Due to the different types of plants within the different geographical areas of the Savannah biome, game farm managers must be aware of which types of animals prefer which type of plant species and the amount and type of water the animal species needs to survive.

4.2.2 Albany Thicket

The biome is represented as light green on the map and occurs mostly inland in the Eastern and province along the coast from the KwaZulu-Natal province to the Western Cape province (Department of Environmental Affairs, 2015b:8; Quintin, 2010; Rutherford, *et al.*, 2006:31). The biome is ideal to accommodate nature-based tourism activities and hunting (Department of Environmental Affairs, 2015b:9). The biome borders the Savanna biome in the east, the Grassland biome in the north, the Nama Karoo biome in the north west and the Succulent Karoo biome and Fynbos biomes in the east (Rutherford, *et al.*, 2006:31). This biome covers just over 2% of the geographic area of South Africa and has a high species diversity (Rutherford, *et al.*, 2006:37-39). The biome lends itself well to land-use that incorporate wildlife (Department of Environmental Affairs, 2015b:8). Vegetation involves evergreen trees and shrubs that grow between a half a metre and three metres tall (Department of Environmental Affairs, 2015b:8; DEA, 2013:15). The vegetation is similar to that found in the Savanna, Nama Karoo and Forest biomes and vary from dense evergreen shrubs to trees (Quintin, 2010; Rutherford, *et al.*, 2006:37-39) but differs from the Savannah in that vegetation grows too low to be a forest, there is too little grass to classify it as a Savanna biome and the dense vegetation makes the biome impenetrable. Forests are also prevented from forming because of fires (UConn, 2016:3). Moderate soil moisture and evaporation occur in summer (Rutherford, *et al.*, 2006:37-39) as well as rainfall that varies between 200mm and 1 000mm (DEA, 2013:15; Rutherford, *et al.*, 2006:37-39). Generally, rainfall is unpredictable and occurs in arid areas with high temperatures (Bothma & du Toit, 2016:873; Duker, *et al.*, 2015:168). If higher rainfall occurs over a long period, forests may form as trees will grow higher (UConn, 2016:3). The average annual temperature is 17.2°C with, on average, 9 frost days. Evaporation is approximately 2 025mm per year and soil, which is generally fertile, receives stress on approximately 281 days when the evaporation demand is more than double the moisture that the soil is able to supply (DEA, 2013:15; Rutherford, *et al.*, 2006:40).

Similarly to the Savannah biome, the amount of rainfall and fires will impact the type of animals and water sources that management must plan for on game farms. Proper veld management stems from proper plant and animal species that are maintained at the right density. If the veld condition is good, then vegetation is seen as more palatable. However, the opposite is also true. Good veld condition allows for a favourable habitat that is imperative for conservation and management must thus prevent bush encroachment and

realise that, if damage to the thicket biome occurs, the recovery period is long and unpredictable. Soil protection and maintaining the right plant and animal species and density is crucial to good veld condition (Bothma & du Toit, 2016:873). The animal species suitable for these biomes are mentioned below.

In areas where thickets occur, popular herbivore species are the blue and grey duiker, bushbuck, nyala and suni. All these herbivores are not water dependent, except for the bushbuck that prefer 1.5 litres of water from natural sources during the day (Bothma & du Toit, 2016:873). Current herbivores found in this biome includes the African savanna buffalo, blue duiker, bushbuck, bushpig, Cape grysbok, elephant, greater kudu, grey duiker, klipspringer, ostrich and the red duiker (Bothma & du Toit, 2016:42; Department of Environmental Affairs, 2015b:8). Traditionally, the black rhinoceros, nyala, red hartebeest, Sharpe's grysbok, warthog and waterbuck were also found in this biome (Bothma & du Toit, 2016:42). The African savanna buffalo, blue, red and grey duiker, bushbuck, elephant, greater kudu and klipspringer occur in the Savanna biome and Albany Thicket. Their ideal habitat requirements were mentioned in the previous section. The exception is the Cape grysbok that tends to occur in the Albany Thicket, but not necessarily in the Savanna biome. Cape grysbok are not water dependent and prefer shrubs and fynbos in their habitat (Bothma & du Toit, 2016:).

4.2.3 Fynbos

Fynbos is represented by purple on the map and occurs mostly in the Western and Eastern Cape provinces. The biome borders mostly the Succulent Karoo biome as well as the Albany Thicket in the Eastern Cape province to a lesser extent (Rutherford, *et al.*, 2006:31). The biome lends itself well to land-use that incorporate non-consumptive tourism (Department of Environmental Affairs, 2015b:25). Fynbos covers approximately 6.6% of the geographic area of South Africa and includes a large variety of species (UConn, 2016:6; Rutherford, *et al.*, 2006:37-39). Browsers and grazers can survive in the biome, but artificial water may change the migration behaviour of animals as they seek water in specific areas where water occurs (Duker, *et al.*, 2015:168; Bothma & du Toit, 2016:886-888).

The biome borders the Succulent Karoo biome and, in certain areas, mixed vegetation occurs (Rutherford, *et al.*, 2006:37-39), however the climate, soil and geology is different from the Succulent Karoo biome which will impact land-use as different animals will be more suitable to the different conditions (DEA, 2013:16). The biome is located on the western part of South Africa and receives between 210mm and 800mm or up to 2 000mm of rain in winter, depending on the geographic location (Bothma & du Toit, 2016:884-886; DEA, 2013:16; Rutherford, *et al.*, 2006:37-39). Summers are seen as dry and hot (Bothma & du

Toit, 2016:884-886). The winter rainfall allows for a high level of soil moisture (Rutherford, *et al.*, 2006:37-39). The average annual temperature is 15.7°C and, on average, the biome experiences 14 frost days. Evaporation is approximately 2 047mm per year and soil receives stress on approximately 263 days when the evaporation demand is more than double the moisture that the soil is able to supply (Rutherford, *et al.*, 2006:40). Wild fires ensure the sustainability of the Fynbos biome (Bothma & du Toit, 2016:884-886; DEA, 2013:17). The seasonality and frequency of fires must be considered (DEA, 2013:17) and fires that occur too frequently or at the incorrect time of the year hinder the conservation and sustainability of Fynbos. Agriculture is another threat that hinders conservation (UConn, 2016:6). The biome is well conserved in the mountainous areas whilst the low lying areas are vulnerable and in need of conservation (DEA, 2013:17). It is therefore advisable that game farm managers focus on small game that do not require trees for survival (DEA, 2013:16) while simultaneously incorporating conservation in land-use. Currently the bontebok, Cape grysbok, grey duiker, grey rhebok, klipspringer and steenbok are currently found in this biome. Traditionally the black rhinoceros, bushbuck, Cape mountain zebra, eland, hippopotamus, ostrich, red hartebeest and springbok were found in the area (Bothma & du Toit, 2016:42). Land-use therefore may incorporate the existing smaller species mentioned above, as well as reintroducing species that were found in the biome historically.

4.2.4 Succulent Karoo

The Succulent Karoo biome is represented by yellow on the map and occurs along the western coast in the Northern Cape province and, to a lesser extent, in the Western and Eastern Cape provinces – almost parallel to the Fynbos biome. In certain areas, patches of Fynbos occur within the biome that borders the Fynbos region towards the south in the Western and Eastern Cape provinces. In such areas, land-use recommendations of the Fynbos biomes must be considered. The majority of this biome borders the Nama Karoo biome in the Northern, Western and Eastern Cape province (Rutherford, *et al.*, 2006:31). The biome lends itself to tourism land-use that is expected to grow in future (Department of Environmental Affairs, 2015b:41). This biome covers approximately 6.5% of the geographic area of South Africa, occurs as high as 1 500m above sea level and has the widest variety of plant and animal species. Similarly to Fynbos, the Succulent Karoo is one of the smallest biomes in the world (Rutherford, *et al.*, 2006:30,37-39; UConn, 2016:11). The average annual temperatures is 16.8°C with, on average, 16 frost days. Evaporation is approximately 2 516mm per year and soil receives stress on approximately 296 days when the evaporation demand is more than double the moisture that the soil is able to supply (Rutherford, *et al.*, 2006:40). Conservation is low, but should be considered due to the number of rare and alien species within the biome (UConn, 2016:11).

This biome only provides good grass cover for a short time during the year and does not offer an ideal habitat for grazers. If grazers are kept on a wildlife ranch, the area per animal should be larger as animals need a larger habitat and vegetation to obtain all the nutrients needed for survival (DEA, 2013:15). Herbivores currently found in this biome are the Cape grysbok, gemsbok, klipspringer, ostrich, springbok and steenbok. Traditionally, the Cape mountain zebra was found in the biome as well, but no longer (Bothma & du Toit, 2016:42). Land-use may be affected by the combination of the size of land and type of animals as, if grazers are kept, fewer animals may be kept sustainably on a game farm. This may have cost implications relating to feeding, water and maintenance.

Moist soil helps with vegetation growth but, unfortunately, the area is synonymous with a low, yet reliable, winter rainfall of between 100mm to 290mm and, in some areas, as low as 20mm per year. Generally, the biome is associated with high temperatures in a semi-arid climate (Quintin, 2010; DEA, 2013:15). These climatic conditions impact vegetation and the productivity of animal species that management must consider (Bothma & du Toit, 2016:890-893; DEA, 2013:13; Rutherford, *et al.*, 2006:37-39; UConn, 2016:11). The lack of water and rainfall makes the biome unsuitable for agriculture. However other characteristics, such as wine and flower displays, make the area favourable for tourism (UConn, 2016:11).

4.2.5 Desert

The desert biome is represented in grey on the map and occurs in the northern part of the Northern Cape province. The biome runs almost parallel to the border of Namibia and borders the Succulent and Nama Karoo biomes (DEA, 2013:16; Rutherford, *et al.*, 2006:31). Desert biomes are ideal for agriculture and wildlife land-uses thus making mixed farming possible (Department of Environmental Affairs, 2015b:12). Deserts mostly occur in the north western part of South Africa and cover approximately 0.5% of the geographical area of South Africa (DEA, 2013:16; Rutherford *et al.*, 2006:37-39). The biome is characterised as dry and arid and receives a low summer rainfall of between 10mm and 70mm. Drought is an ongoing reality, but grazing opportunities exist - especially for livestock (DEA, 2013:16; Khavhagali, 2010:15; UConn, 2016:3). Soil moisture is low in summer and winter and the evaporation rate high due to the high temperatures (Rutherford, *et al.*, 2006:37-39).

Black rhinoceros, blue wildebeest, Burchell's zebra, eland, gemsbok, giraffe, greater kudu, grey duiker, klipspringer, ostrich, red hartebeest, springbok, steenbok and warthog are currently found in the biome. All these animals were traditionally found in the biome as well. The only herbivore that was traditionally found and that is not found presently is the roan antelope (Bothma & du Toit, 2016:42). Game farmers must consider the availability of water and rainfall and the amount of water each animal needs. Land-use may incorporate the storing of artificial water sources for times of severe drought.

4.2.6 Forests

Forests are represented in black on the map and only occur in the Western and Eastern Cape provinces in very small areas (DEA, 2013:16; Rutherford, *et al.*, 2006:31). In total, forests make up 0,25% of vegetation in South Africa which makes it the smallest biome (Quintin, 2010; Rutherford, *et al.*, 2006:37-39) and cover approximately a quarter of a percent of the geographic area of South Africa (UConn, 2016:4). The biome lends itself well to land-uses that involve tourism (Department of Environmental Affairs, 2015b:18). The biome is characterised by multiple layers of vegetation and evergreen trees. Generally, the ground cover is poor due to little sun penetration (Department of Environmental Affairs, 2015b:16; UConn, 2016:4). This biome receives the highest rainfall (Rutherford, *et al.*, 2006:37-39) that includes up to 525mm or rain in winter and 725mm rain in summer (DEA, 2013:16; UConn 2016:4). The average annual temperature is 17°C with, on average, 0 frost days. Evaporation is approximately 1 769mm per year and soil receives little stress with regards to moisture evaporation as little sun reaches the bottom layer of vegetation (Rutherford, *et al.*, 2006:40). Forests can be found in small areas up to 1 200m above sea level. Higher lying areas are not ideal for forests as frost hinders the development of forests. Fires represent another threat to forests as they can prevent the tree canopy from forming (UConn, 2016:4).

Generally, forests are more suitable for smaller animals (Department of Environmental Affairs, 2015b:17). The animals that were traditionally found in forests still are found in forests today. These animals include the blue duiker, bushbuck, bushpig, elephant, grey duiker and red duiker (Bothma & du Toit, 2016:42). In forests the blue duiker, suni and red duiker are not water dependent. Elephant are water dependent and prefer 150 to 300 litres of water from natural sources during the day and night. Nyala are water dependent to a lesser extent and prefer about 3.5 litres of water from natural sources during the night (Bothma & du Toit, 2016:).

4.2.7 Indian Ocean Coastal Belt (IOCB)

The IOCB is represented by brown on the map and runs parallel with the east coast of South Africa. The only biome that borders the IOCB is the Savanna biome (Rutherford, *et al.*, 2006:31). The IOCB covers approximately 1% of the geographical area of South Africa (Rutherford, *et al.*, 2006:37-39) and occurs in the Eastern Cape and KwaZulu-Natal provinces at an altitude of between zero and 600m above sea level. The biome is mostly synonymous with dunes and grassy plains. It is one of the few biomes that is characterised as having rain throughout the year of up to 1 272mm (DEA, 2013:18). The average annual temperature is 20°C and, on average, the biome experiences 0 frost days. Evaporation is approximately 1 737mm per year and soil receives stress on approximately 240 days when the evaporation demand is more than double of the moisture that the soil is able to supply

The area is not known to experience frost and soil moisture is high in both summer and winter due to the area receiving rain year-round. No animals are specifically indicated as suitable for this biome. However, if further inland and the vegetation is suitable, certain animal species can adapt. (Rutherford, *et al.*, 2006:37-40).

4.2.8 Grassland

The Grassland biome is represented by dark green on the map and occurs in the majority of central South Africa towards the east. The majority of Mpumalanga, the Free State and Gauteng provinces, part of the North West province, the interior of the Eastern Cape province and the KwaZulu-Natal province is covered in this biome (Quintin, 2010; Rutherford, *et al.*, 2006:31). The biome borders the Savanna biome in the west, north and east and the Nama Karoo and Albany Thicket in the west and south (Rutherford, *et al.*, 2006:31). The Grassland biome is the third largest biome and covers almost 28% of the geographical area of South Africa (Rutherford, *et al.*, 2006:37-39). Land-use that incorporate wildlife are replacing cattle, sheep farming and crop farming (Department of Environmental Affairs, 2015b:29,30). The area is high in biodiversity and consists of flat plains with a single grass cover that varies depending on the amount of rain the biome receives. Lower rainfall tends to produce sweet grass that is low in fibre, but palatable with stable nutrient levels throughout the year. Higher rainfall leads to sour grass that is high in fibre and acidic soil, but is unpalatable with nutrients high only in winter. The rainfall also has an effect on grazing as the grasses can take high levels of grazing and, if managed properly, overgrazing can increase grasses (UConn, 2016:3-4). The high amount of grazing and the high occurrence of frost and fires hinder trees from developing (UConn, 2016:3). Apart from grazing, the biome is also used for agricultural uses, such as corn, wheat and sunflower farming (UConn, 2016, 3-4). The combination of sweet and sour veld in the same biome is similar to what occurs in the Savannah biome.

The average annual temperatures is 14.7°C with, on average, 40 frost days. Evaporation is approximately 1 991mm per year and soil receives stress on approximately 274 days when the evaporation demand is more than double of the moisture that the soil is able to supply (Rutherford, *et al.*, 2006:40). The biome is further characterised by a summer rainfall of between 400mm and 1 200mm of rain. Cold winters with frost and snow hinder tall trees from developing. The biome borders all types of biomes except for Fynbos, Desert and the Succulent Karoo and is extremely threatened with only approximately 2% being conserved (DEA, 2013:17). Land-use must incorporate conservation as it is one of the least protected and most threatened biomes in South Africa (Fourie, *et al.*, 2015:67; Rutherford & Powrie, 2011:1408) and 45% of the biome is threatened due to alien plants that invade certain areas of the biome. The high conservation risk is due to mining, agriculture, overgrazing and

agriculture. However, even with the threats associated with the biome, the biome has a high diversity of species (Fourie, *et al.*, 2015:67-68).

The size and different characteristics within the Grassland biome make different geographical areas more or less favourable for different herbivores and this must be considered during land-use planning. In general, the current herbivores that are found include the African savanna buffalo in certain areas where, traditionally, they were not found. Black wildebeest, blesbok, bushpig, Cape mountain zebra, eland, grey duiker, grey rhebok, klipspringer, mountain reedbuck, oribi, ostrich, springbok and steenbok are presently found in this biome. Herbivores that were found, historically, are the black rhinoceros, blue wildebeest, Burchell's zebra, bushbuck, greater kudu, grey rhebok, nyala, red duiker, red hartebeest, steenbok in certain areas, warthog and white rhinoceros (Bothma & du Toit, 2016:42). Grasslands are enjoyed by bushpigs, gemsbok, oribi, red hartebeest, sable antelope, springbok, steenbok, tsessebe, warthog, waterbuck and white rhino. white rhinos are water dependent and prefer about 72 litres of water from both natural and artificial water during the day (Bothma & du Toit, 2016:).

4.2.9 Nama Karoo

The Nama Karoo is represented by pink on the map and occurs mostly in central South Africa towards the west. The majority of the biome occurs in the arid Northern Cape province's inland areas as well as the Western and Eastern Cape provinces to a smaller extent. The biome borders the Succulent Karoo biome in the west and south, the Savanna in the north and Grassland in the east. Small parts border the Albany Thicket in the Eastern Cape province in the south and the west (DEA, 2013:17; Khavhagali, 2010:14; Rutherford, *et al.*, 2006:31). Currently agriculture and stock farming are popular land-use activities with wildlife increasingly being incorporated into land-use. In addition, ecotourism is also incorporated into land-use (Department of Environmental Affairs, 2015b:12-14; Khavhagali, 2010:15). The Nama Karoo biome is the second largest biome and covers approximately 20% of the geographic area of South Africa (Rutherford, *et al.*, 2006:37-39). Rainfall ranges from 60mm to 400mm and rainfall is greater toward the west (DEA, 2013:17). Livestock grazing can assist with shrub growth but care must be taken with overgrazing. In general, this biome is poorly conserved and fires are rare because of the type of vegetation (UConn, 2016:10). It receives a late summer rainfall that varies between 100mm and 520mm per year of which approximately 5% reach rivers (Rutherford, *et al.*, 2006:37-39; UConn, 2016:10). The high temperatures and rainfalls, generally, lead to increased pests which may be a challenge for wildlife owners (Department of Environmental Affairs, 2015b:14). Game within this biome tend to be nomadic and travel to rainfall areas (UConn, 2016:10). The average annual temperature is 16.8°C and high maximum temperatures often exceed comfort

thresholds of wildlife (Department of Environmental Affairs, 2015b:14). On average, the biome experiences 35 frost days. Evaporation is approximately 2 583mm per year and soil receives stress on approximately 307 days when the evaporation demand is more than double the moisture that the soil is able to supply (Rutherford, *et al.*, 2006:40). Soil is of poor quality and tends to be sandy (UConn, 2016:10).

Herbivores currently found in this biome are the Cape mountain zebra, gemsbok, klipspringer, ostrich, springbok and steenbok. Herbivores that were traditionally also found in this biome are the red hartebeest, greater kudu, eland, Cape grysbok, blesbok, black wildebeest and black rhinoceros (Bothma & du Toit, 2016:42).

This discussion gives an estimated size of biomes, climatic conditions, the general location of the biomes in South Africa, the herbivores and preferred vegetation of the herbivores as well as other general information. Managers of privately owned game farms should consider the biome in which their game farm is located. The type of vegetation and climate, water availability and soil should be considered when considering the type of animals and when manipulating the animal habitat in the biome. This can impact land-use in terms of the four pillars as certain animals and regions may be more favourable for certain activities. Examples are hunting specific species, tourism related activities and conservation. It should also be noted that climatic conditions are said to change over time and that by the year 2050 the characteristics of biomes, as they are now, may change due to climate change. Thus, the type of animals that currently thrive in a specific area due to specific biomatic and climatic conditions are discussed in section 4.3 and 4.4. Private wildlife farmers must realise that animals that thrive in current locations may not thrive in future in the same location because of biomatic and climatic changes. Private game farm owners must therefore consider the changes in land-use over time. The next sections highlight diseases that impact game.

4.3 DISEASES OCCURRING IN DIFFERENT BIOMES/PROVINCES

The animals mentioned in the previous section can be susceptible to specific diseases that are spread in various ways (Bothma & du Toit, 2016:143). Animal diseases should be reported to the Directorate: Animal Health who summarises all diseases per province. As diseases are reported, they receive a specific status and code based on the geographic area and the date of the report. The diseases below are all present in South Africa (DAFF, 2016).

4.3.1 Anthrax

Anthrax is a bacterium that occurs inside an animal's body. If the bacterium is exposed to flies, water or soil and other animals then come in contact with the flies, soil and water, the animals can become infected. Carnivores that feed on anthrax-infected herbivores can become carriers. Legally, a carcass cannot be opened up if the animal died of anthrax as it allows the bacterium to spread. It is advised that the carcass is burnt. Humans, the African buffalo, elephant, warthog, giraffe and greater kudu are susceptible to the disease (Bothma & du Toit, 2016:409-410). Preventative vaccinations can be given by means of drop darts approximately three weeks before an animal moves to an infected area (SAVA, 2015).

4.3.2 Tuberculosis

Tuberculosis spreads quickly and is transmitted through urine, faeces, milk or when animals cough. Lion, greater kudu and the African savanna buffalo are extremely susceptible (SAVA, 2015; National Department of Agriculture, Forestry and Fisheries, 2012) as well as humans and carnivores. Animals infected show very few symptoms if infected. Wildlife managers are advised to test livestock that is kept on the same or neighboring farm and remove infected herbivores from game farms (Bothma & du Toit, 2016:410; National Department Agriculture, Forestry and fisheries, 2012). Vaccinations exist and, in South Arica, the disease is mostly found in the Kruger National Park area (SAVA, 2015).

4.3.3 Brucellosis

Brucellosis is a very contagious disease that is spread orally, through the eyes and open wounds. The disease causes animals to dehydrate, get infected and decompose easily. Although brucellosis is more severe in livestock, humans, carnivores and, especially, the African savanna buffalo are susceptible to the disease. Livestock, especially if kept with wildlife, must be vaccinated. However, inoculation should be avoided if African buffalo is disease free (Bothma & du Toit, 2016:410-411).

4.3.4 Trueperella

The disease is spread through open wounds, such as tick bites. Symptoms include pneumonia, paralysis, blindness or inflammation. Infected animals can be treated with penicillin and animals should be isolated when treated. If the disease is expected, the animals can be inoculated to prevent the disease from spreading. Non-infected animals should not be mixed with infected animals from neighboring farms or infected translocated animals (Bothma & du Toit, 2016:4111-412).

4.3.5 Foot and Mouth Disease

The disease is spread through ingestion and inhalation and occurs mostly in the Mpumalanga, Limpopo and KwaZulu-Natal provinces. The African savanna buffalo is the carrier and the seriousness of the disease depends on the type of animal infected (Bothma & du Toit, 2016:412-413). All cloven hooved animals are susceptible and vaccinations are suggested in areas where the disease occurs (Department Agriculture, 2012). Livestock is also susceptible and great care must be taken when infected animals are translocated. Immunisation, quarantine and culling are measures taken by the state veterinarian to prevent the disease from spreading (Bothma & du Toit, 2016:412-413). If animals are relocated, a permit is necessary and fences, rivers and roads can help to keep animals in an infected or uninfected area. The disease does not cause the death of an animal, but there are economic losses to owners (Department Agriculture, 2012).

4.3.6 Bovine Malignant Catarrhal Fever

The deadly disease is spread between cattle and the blue and black wildebeest and, to prevent infections, the species must be separated by at least 1 kilometre (National Department of Agriculture, Forestry and Fisheries, 2012). How it is spread is unknown. The disease does not spread between cattle and almost 100% of black and blue wildebeest are infected. Farm owners are not hindered from keeping cattle and blue and black wildebeest on the same farm, declare the disease if animals are translocated or get permission from neighboring farms if infected animals are owned. If there are legal cases of animals becoming infected, a map of the locations of the animals, the financial implications, evidence that mortality was due to the disease and the actions that helped to prevent the disease from spreading must be provided (Bothma & du Toit, 2016:413).

4.3.7 Swine Flu

Is a contagious disease with no visible symptoms. The disease is spread by ticks when warthogs and bushpigs come in contact with domestic pigs (Bothma & du Toit, 2016:414; Department Agriculture, 2012). There is no vaccine against swine flu and preventative measures involve not translocating pigs or feeding animals food that stems from infected pigs. The disease is controlled by limiting the movements of domestic and wild pigs (Bothma & du Toit, 2016:414; National Department of Agriculture, Forestry and Fisheries, 2012).

4.3.8 Heartwater

The disease is spread by ticks (SAVA, 2015) and is more threatening to livestock. Wild animals in the northern part of South Africa are susceptible and include giraffe, blue wildebeest, impala, African savanna buffalo, greater kudu and warthog. These animals show no symptoms if infected (Bothma & du Toit, 2016:414; SAVA, 2015).

4.3.9 Rabies

Rabies is spread when one infected animal bites another. Symptoms, initially, involve fearlessness and tame behavior that is followed by violence, paralysis and death. If an animal is expected of having rabies, a state veterinarian must be called. Humans and domesticated animals can receive preventative immunisations (Bothma & du Toit, 2016:415). If wild animals are given an immunisation, it is suggested that they are immobilised (National Department of Agriculture, Forestry and Fisheries, 2012; SAVA, 2015).

4.3.10 Corridor and Buffalo Disease

This disease is deadly for cattle and is spread by ticks on the African buffalo (Bothma & du Toit, 2016:417; National Department of Agriculture, Forestry and Fisheries, 2012). The disease can be prevented if African buffalo are not mixed with cattle. The disease mostly occurs in the Mpumalanga and Limpopo provinces, but not in Addo. Preventative measures include dipping cattle and having electrified fences (Bothma & du Toit, 2016:417). Animals, generally, can't be relocated and, if they must be relocated, the animals must first test negative for this disease (National Department of Agriculture, Forestry and Fisheries, 2012).

The section above highlights different diseases, how they are spread, symptoms, the animals that are infected and the procedures to follow if game farm owners become aware of diseases. Private game farm owners and managers must become aware and know how to deal with the diseases. With diseases that can impact humans, game farm owners and managers must consider the land-use forms where humans come in close contact with possibly infected animals. Certain diseases prevent livestock and game being kept in close proximity on the same or a neighboring farm. Examples are cattle and buffalo as well as pigs and warthogs or bushpigs. This may impact land-use as infected animals may have additional financial or other implications in terms of treating the disease, transporting animals and the activities that land-use involves (Bothma & du Toit, 2016:413-415).

The next section discusses climate change and how it impacts biomes, game farms and wild animals.

4.4 CLIMATE CHANGE

Climate change alters water availability, vegetation in an area, and the animals that can sustainably survive in an area. Various biomes are either more or less vulnerable to climate change, depending on the extent to which climate change threatens different ecosystems (DEA, 2013:12). Each biome can be subdivided into smaller regions that are based on vegetation and climatic conditions that vary within the specific biome (Rutherford, *et al.*, 2006:46-47).

The same type of vegetation in different geographic areas can have different characteristics due to different climates within an area (Moncrieff, *et al.*, 2015:325-326). Climates vary depending on latitude and altitude and areas located at a higher altitude have a lower minimum temperature and higher chances of frost (Duker, *et. al*, 2015:167).

Climate change threatens different biomes to different extents. The Albany Thicket is the least threatened while the Grassland biome is the most threatened and may convert into savannah and forest vegetation. The Nama Karoo biome is the second most threatened biome and the Savannah and Desert vegetation may take over areas in which the Nama Karoo is currently located. The Savanna, Succulent Karoo and Albany Thicket biomes may also replace the Fynbos and Forest biomes depending on the current location of these two biomes. Increased occurrences of fire and lower rainfall threatens forests. The desert biome may become larger (DEA, 2013:8). Climatic changes in the next 35 years will have different effects on different biomes. Small changes in climate will have little effect on the Albany Thicket biome. However, more severe climate changes will allow the Albany Thicket to be replaced by the Nama-Karoo and Savanna biomes. Small climatic changes forecast little effect in the desert biome. However, severe climatic changes will enable the Succulent and Nama Karoo biomes to reduce and Deserts to expand into this area. Fynbos may transform into Succulent Karoo or Albany Thicket. Grasslands will suffer under climatic conditions. The IOCB may change into Savanna if water availability decreases. An increase in warmer climates may allow the IOCB to expand. Nama-Karoo may convert into Savanna with little climate change. In more severe circumstances, it may change into a Desert climate. Certain Savanna species may thrive under climatic changes, while other may be impacted negatively (DEA, 2013:25). The change in biomes over time means that land-use will change. Game farm owners and managers must consider and plan for future climatic and biome changes and continuously adapt land-use toward changing biomes.

A well-managed ecosystem that encourages biodiversity can reduce the severe impacts of climate change. Examples are buffers from floods, preparing for droughts in advance, planning infrastructure to prevent erosion and consider animal habitats so that the animals can thrive under climate change conditions, be sustainable and provide humans with the needs currently obtained from them (DEA, 2013:8-9).

4.5 CONCLUSION

The aim of this chapter was to discuss the biomes in South Africa, animal diseases and climate change. The discussion on biomes highlighted the province(s) in which the biomes currently occur, the general climatic conditions that occur within the biomes, information on the vegetation within the biomes and a list of animals that occur in the biomes. The discussion also highlighted the approximate amount of water that the animals need to survive within a habitat. The amount of rainfall in each region has also been mentioned. The discussion on diseases gave a short description of the symptoms, the manner in which the diseases are spread and the animals that can be impacted by the specific disease. The health of animals in these habitats influences the animals and the land-use models private game farm owners implement. Certain animals and diseases hinder or prevent certain land-use models and may have additional health related expenditure. An example is disease-free buffalo that need to be kept separate from those buffalo that suffer from foot and mouth disease. Lastly, the discussion on climate change highlighted that changes in climatic conditions will change the areas in which certain biomes currently occur. If climate change causes vegetation and rainfall changes, the species that currently adapt well in a certain area may change.

The next chapter discusses the methodology and empirical results.

CHAPTER 5

EMPIRICAL RESULTS

5.1 INTRODUCTION

Chapter 1 of this study explained the aim and method of the study and chapter 2 explained the four pillars of the private wildlife industry, mixed farming and infrastructure. Chapter 3 explained legislation and chapter 4 biomes, climate change and animal diseases. The aim of this chapter is to explain the methodology and empirical results of the study. This chapter consists of six main sections. Three of the sections relate to the empirical results. The first relates to results that explain national land-use. The second relates to results that explain land-use based on the size of establishments. The third section relates to results that explain provincial land-use. Figure 5.1 depicts the layout of the chapter.

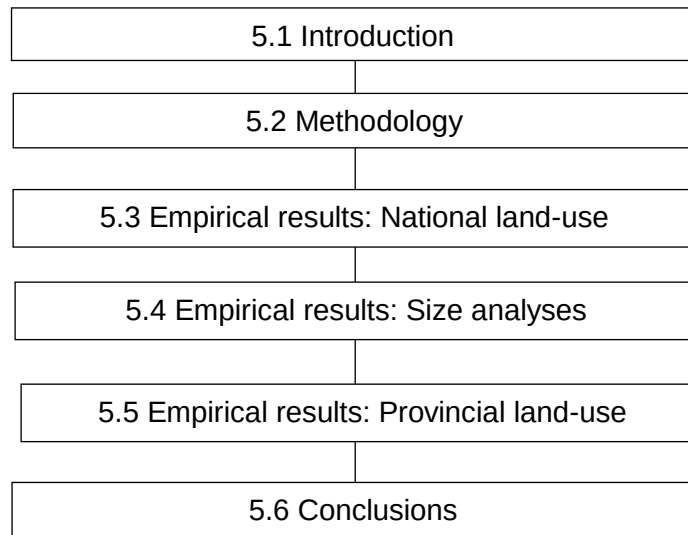


Figure 5.1: Chapter layout

5.2 MEHODOLOGY

This methodology section discusses the research design, the sample and the data collection and analysis processes.

5.2.1 Research design

A research design is a research plan that guides a researcher to achieve the research objectives. The research objectives were stated in section 1.4. This section (section 5.2) aims to explain the research process that is applicable to this research project (Wilson, 2010:102).

In this research study, qualitative action research was applied by means of an interview. The first important term here is 'qualitative research'. Qualitative research focuses on words and

not the quantification of data. Qualitative research also collects different attitudes and strategies that help to determine the way that individuals understand, experience and interpret their surroundings (Hammersley, 2013:1). The aim of data gathering is to obtain a deep understanding of a phenomenon and gain different insights that describe different perspectives that create unique realities that are analysed at the end of the data collection process. The end results aim, firstly, to become familiar with the various aspects that make up a phenomenon and, secondly, to determine which factors must be considered as part of a phenomenon (Maree, 2016:81). Throughout the process, the researcher forms part of the interview instrument and data collection process and cannot be separated from the data gathering process. Qualitative research aims to understand a phenomenon and use unobtrusive data gathering techniques to gather information (Maree, 2016:78-79).

The second important term is “interview”. Interviews are seen as an efficient and effective qualitative method of collecting data (Kirkevold & Bergland, 2009:68). Such qualitative interviews involve the researcher or interviewer to be in control of the interview process that combine the gathering of facts and meanings whilst the interview is in progress (Valenzuela & Shrivastava, nd; Kirkevold & Bergland, 2009:69). In addition to facts and meanings, qualitative data also collect data on actions, experiences, different phenomena and surroundings of different interviewees (Kirkevold & Bergland, 2009:69). Within this research study an interview guide approach was used which involve gathering similar areas of information from each interviewee and allowing interviewees to choose information from a particular set of alternative choices (Valenzuela & Shrivastava, nd).

The third important term is “action research”. Action research aims to find solutions to everyday problems and increase the effectiveness of the working environment. (Stringer, 2014:1). Action research aims to improve and change a phenomenon for the better and aims to empower individuals to implement the ‘improvements’ (Maree, 2016:71). The end result of action research is to offer systematic and practical considerations that will lead to sustainable improvements (Maree, 2016:74; Stringer, 2014:5). The research focuses on a problem which is followed by an inquiry that leads to explanations and understanding. The explanations are not general in action research, but rather situation-specific (Stringer, 2014:5-6).

These discussions highlight certain facts that relate to qualitative research, qualitative interviews and action research which are important for this research study. The first is the collection of different strategies and insights that help to determine how individuals understand, experience and interpret their unique surroundings (Hammersley, 2013:1). The literature provided in chapters 2 to 4 and the data collected through primary data collection aimed to gather information on the different factors that impact the private wildlife industry in

general as well as in different areas within South Africa. Examples are demographic and economic factors, climate, biomes, provincial legislation, species, managerial decisions and which pillars are incorporated into land-use and how the pillars are incorporated into land-use.

The second is the data collection process. The process is discussed in paragraph 5.2.3. In qualitative research, the researcher forms part of the data collection process and collects data in an unobtrusive manner (Cresswell, 2009). In this research study, personal interviews were conducted by means of a semi-structured interview instrument which allowed the researcher to gather similar areas of information that included both facts and meanings with regards to actions, experiences, different phenomena and surroundings (Kierkeveld & Bergland, 2009:69; Valenzuela & Shrivastava nd). The interviews were voluntary and only conducted if interviewees were willing and had time to participate.

The third important aspect is the aim of action research which is to increase effectiveness and make suggestions on improvements within the working environment (Maree, 2016:1,74; Stringer, 2014:1,5). This research project aims to create a national model to guide private wildlife establishments and industry of South Africa as a whole as well as, preceding the national model, a province-specific model that will guide private wildlife establishment owners to make decisions that are linked to their surroundings and to consider the specific factors that impact their wildlife establishment.

The last aspect is that data must be obtained in an unobtrusive manner. The unobtrusive manner must not restrain the researchers from collecting data that summarise the understanding, experiences and unique surroundings of private wildlife establishment owners (Maree, 2016:78-79). At no point were the interviewees forced to participate and the interviewees were able to end the interview at any time. The interviewees (private wildlife establishment owners) constituted the sample which is discussed next.

5.2.2 Sample

A sample involves individuals that have information or knowledge that is needed by a researcher (Martella, *et al.*, 2013:305). This research study applied purposeful sampling since individuals (interviewees) had specific knowledge needed by the researcher (Maree, 2016:79). The sample size for qualitative research is generally smaller than that of quantitative research. The reason is that that sample is contacted continuously until similar themes are mentioned by the sample and repeatedly captured by the researcher (Maree, 2016:79).

This research project required information on the land-use of private wildlife establishments in South Africa. After consideration, it was decided that non-probability sampling should be

applied which allowed the researcher to gain easy access to the sample (Showkat & Parveen, 2017:6). The sample represented a small percentage of the total population and had applicable knowledge and information, based on the real-life phenomenon, that the study aimed to research. that the best and most effective method of coming in contact with the sample, private wildlife establishment owners, would be at wildlife auctions. Between 2016 and 2018, the researcher and the research assistants that assisted with the research process attended 14 wildlife auctions and the Wildlife Ranching South Africa annual conference. Thus all nine provinces of South Africa were covered. The auctions and wildlife conference allowed the researcher to interview 223 private wildlife establishment owners that made up the total sample. The number of auctions at which the sample were interviewed are indicated on the map below.



Figure 5.2: Number of auctions attended per province

Source: Sartorius, 2018

In the Limpopo province, five wildlife auctions were attended to gather data. Three auctions were attended in the North West province, two in the Northern Cape and one each in the Western Cape, Eastern Cape, Free State, KwaZulu-Natal and Mpumalanga provinces. No auctions were attended in the Gauteng province. However, the Gauteng province private wildlife establishment owners were interviewed in other provinces. The Gauteng province private wildlife establishment owners were interviewed when they travelled across borders to auctions. A further breakdown of the number of interviews per province is given as part of the empirical results in section 5.3. Wildlife auctions were continuously visited and the sample interviewed until similar themes appeared across different interviews throughout the data collection process. The data collection process is explained in the next paragraph.

5.2.3 Data collection

The research process followed in this research study is that of Creswell (2009). Creswell's six-step process begins with organising the data collected. However, before reaching the data collection stage in the research process where Creswell's six steps can be applied, it is necessary to explain the steps in the research design that led to the way that data was collected. These involve a literature review and the design of an interview instrument.

5.2.3.1 Literature review

The first step was secondary data collection by means of a literature review. The literature review (chapters 2 to 4) assisted with a general understanding and background to the research study (Oliver, 2012:5; Ridley, 2012:3). The relevant elements identified and researched were obtained through keywords that led to researching books, journal articles and published legislation that led to relevant information. Keywords used involved wildlife ecotourism, hunting, by-products, game sales, breeding, mixed farming, land-use, infrastructure, wildlife legislation, climate change, animal diseases and biomes. While the literature review was written, the interview instrument was developed so that the sample could be interviewed to collect primary data. The interview instrument design process is explained next.

5.2.3.2 Interview instrument design

The instrument was developed by consulting relevant literature and discussions with WRSA management, Dr Dry (member of the presidential council (2016) and former president of WRSA), Ms Adri Kitshoff-Botha (CEO of WRSA), Professor Flippie Cloete of the research advisory committee and Professor Hoffman (head of the research community of WRSA). Their knowledge and experience on the private wildlife industry of South Africa was vital in the development of the instrument. The instrument was divided into six sections that aimed to gather five categories of data from interviewees. The first section, Questions 1-8, aimed to

gather demographic details of interviewees that included information on the location of the wildlife establishment (the province and district), the biome in which the wildlife establishment is located, the size of the wildlife establishment, how long the wildlife establishment has been operational, the type of ownership of the wildlife establishment and the species kept on the wildlife establishment. The second section, Questions 9 to 11, aimed to gather information on land-use. Question 10 allowed interviewees to provide information on land-use and the different pillars of the wildlife industry where Questions 9 and 11 elaborated on certain pillars – breeding and ecotourism-related activities. The third section, Questions 12 to 16, aimed to gather economic information on wildlife establishments. Questions focused on past capital expenditure, possible future investments and capital invested in land, animals and infrastructure. The fourth section, Question 17, related to challenges and the fifth section, Question 18, to future expansions or investments and the sixth section to any other comments the interviewee felt necessary to share.

The aim of the measuring instrument was to establish a rapport with the private wildlife industry and the way that wildlife establishment owners utilise their land. The report involved a two-way communication during which the interview instrument was used as a guideline to gather information on the interviewees' behaviours and ideas as they related to the private wildlife industry. Semi-structured interviews involved interviewees answering set questions that related to the phenomenon being researched – the private wildlife industry of South Africa (Maree, 2016:87-88). The instrument avoided simple 'yes' and 'no' responses and the researcher was present to probe or guide interviewees.

After data was collected, the data was analysed. The data analysis process is described in the next paragraph.

5.2.4 Data recording and analysis

According to Creswell (2003) there are six steps in qualitative data analysis. Table 5.1 summarises Creswell's six steps and how the six steps were applied in this research study.

Table 5.1: Creswell's six steps

Creswell's six steps	Application of six steps
Step 1: Organise data for data analysis	Data collected from interviews were captured in Microsoft Excel. Each question was entered separately and given a heading in Microsoft Excel® that correlated to the question number in the interview instrument.
Step 2: Read through data to	The data captured in Microsoft Excel® were read

formulate meaning	through twice. At first, each individual interviewee's answers were read through to determine the demographic, land-use, economic and other information provided by the interviewee. This 'first read-through' was followed by a second read-through during which all the individual interviewees' answers per question were compared. The second 'read through' led to step 3.
Step 3: Analyse data	Each question was analysed separately using Excel. Some questions were presented by means of graphs or tables whilst other open-ended questions were analysed and preseted by means of themes (see step 4).
Step 4: Identify themes and code qualitative data	The graphs and tables, themes and information discussed in chapter 2 to 4 were grouped together into themes.
Step 5: Report on data	The data collected and coded are discussed in this chapter from paragraph 5.3. This data described the South African wildlife industry in terms of demographic information, land-use and the four pillars, economic information, challenges and future investments.
Step 6: Interpret larger meaning of data	The data discussed in step 5 are further analysed and combined into smaller sections. The smaller sections describe data collected per province that form the bases of the provincial land-use management model which is the overall aim of this research project.

Source: Cresswell, 2009

The next section report on the data collected by means of empirical results in section 5.3. This section is step 5 in Creswell's six-step process.

5.3 EMPIRICAL RESULTS: NATIONAL LAND-USE

The interview instrument was divided into six sections. The first section discusses the demographic information of private wildlife establishments. The second section discusses the land-use forms. The third section discusses the economics of private wildlife establishments. The fourth section discusses the challenges faced by the private wildlife industry. The fifth section discusses the private wildlife establishment plans for future expansions. The sixth section discusses other suggestions or comments made by interviewees. The results are discussed in sections 5.3.1 to 5.3.6 based on these six sections. Some qualitative data were indicated by means of figures and explained in terms of percentages. These were qualitative information that relate to facts and answers from a set of alternative choices that were similar across all interviews (Kirkevold & Bergland, 2009, :68-69; Valenzuela & Shrivastava, nd).

5.3.1 SECTION 1: Demographic information of private wildlife establishments

Demographic information relates to Question 1 to 9 in the interview instrument (see Appendix A). The information in these questions relates to the location of the private wildlife establishment, the biome or veld type, size of land, years of existence and form of business. The empirical results for these questions are discussed below.

5.3.1.1 Provincial breakdown

Question 1 involved three questions that related to the province, district and biome in which the wildlife establishment is located. Figure 5.3 below indicates the percentage of privately owned wildlife establishments interviewed per province. This is based on 223 interviews.

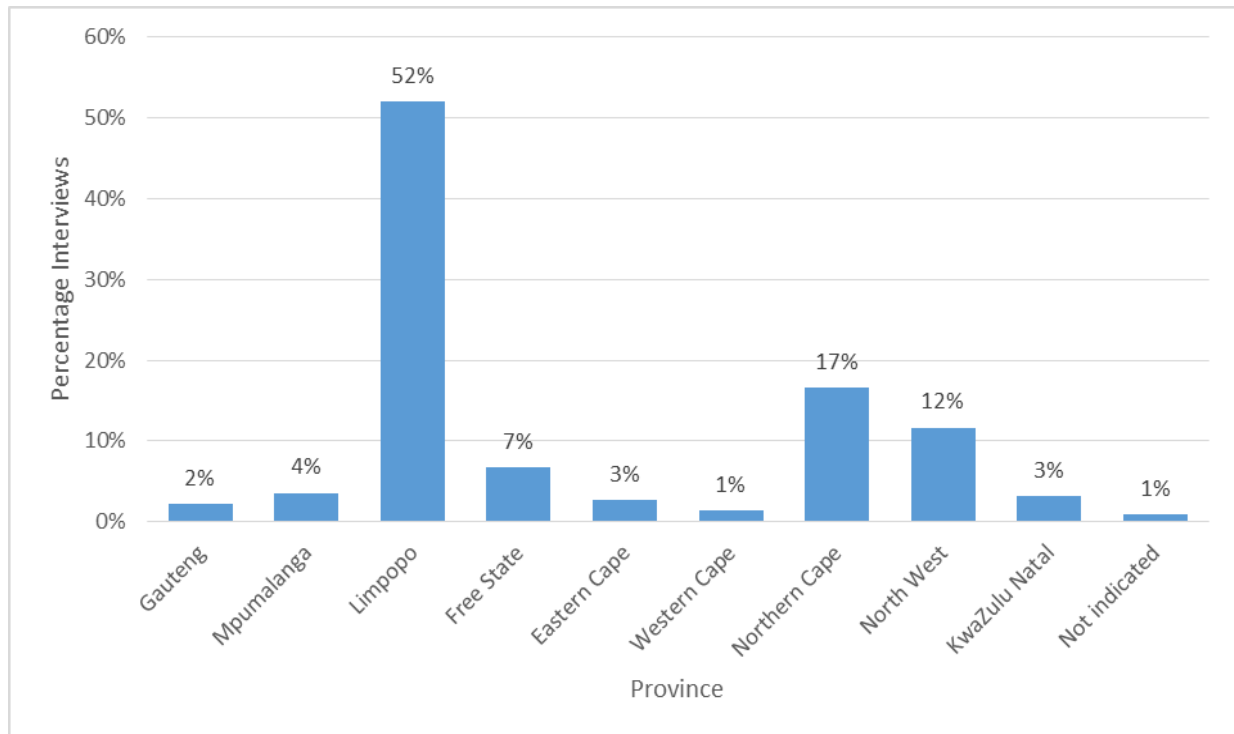


Figure 5.3: Percentage of interviews per province

The largest percentage of wildlife establishment owners interviewed was from the Limpopo province which totalled 52%. The reason is that the Limpopo province has the highest number of game farms and is also the most popular hunting province in South Africa (van der Merwe & Saayman, 2013:104, 108). The second highest number of interviews were done in the Northern Cape (17%). This is also consistent with information that indicated the Northern Cape province is the second most popular hunting province in South Africa (van der Merwe & Saayman, 2013:104, 108). The third highest numbers of interviews were done in the North West province (12%), followed by 7% of interviews from the Free State province, 4% from Mpumalanga province, 3% from the Eastern Cape province and KwaZulu-Natal province respectively, 2% from the Gauteng province and 1% from the Western Cape province. According to van der Merwe and Saayman (2013:104) most game farms are situated, and hunting takes place in the Limpopo, Northern Cape, North West, Eastern Cape, Free State and KwaZulu-Natal provinces. The Mpumalanga, Gauteng and Western Cape provinces have the least. Thus the data collection was done accordingly. Although the map (Figure 5.2) indicated that no auctions were attended in the Gauteng province, the interviewees that indicated that their wildlife establishments are located in the Gauteng province were interviewed at auctions in other provinces.

5.3.1.2 Number of districts

Each province in South Africa is divided into different districts. The district indicates the general area within a province where a private wildlife establishment is located. For

example, in the Gauteng province the two districts were indicated as Pretoria and Vereeniging – Pretoria more towards the north and Vereeniging in the South of the Gauteng province. Such information will be important when the individual provincial land-use information is given in chapter 6. Figure 5.4 indicates the number of provincial districts where the wildlife establishments of interviewees are located.

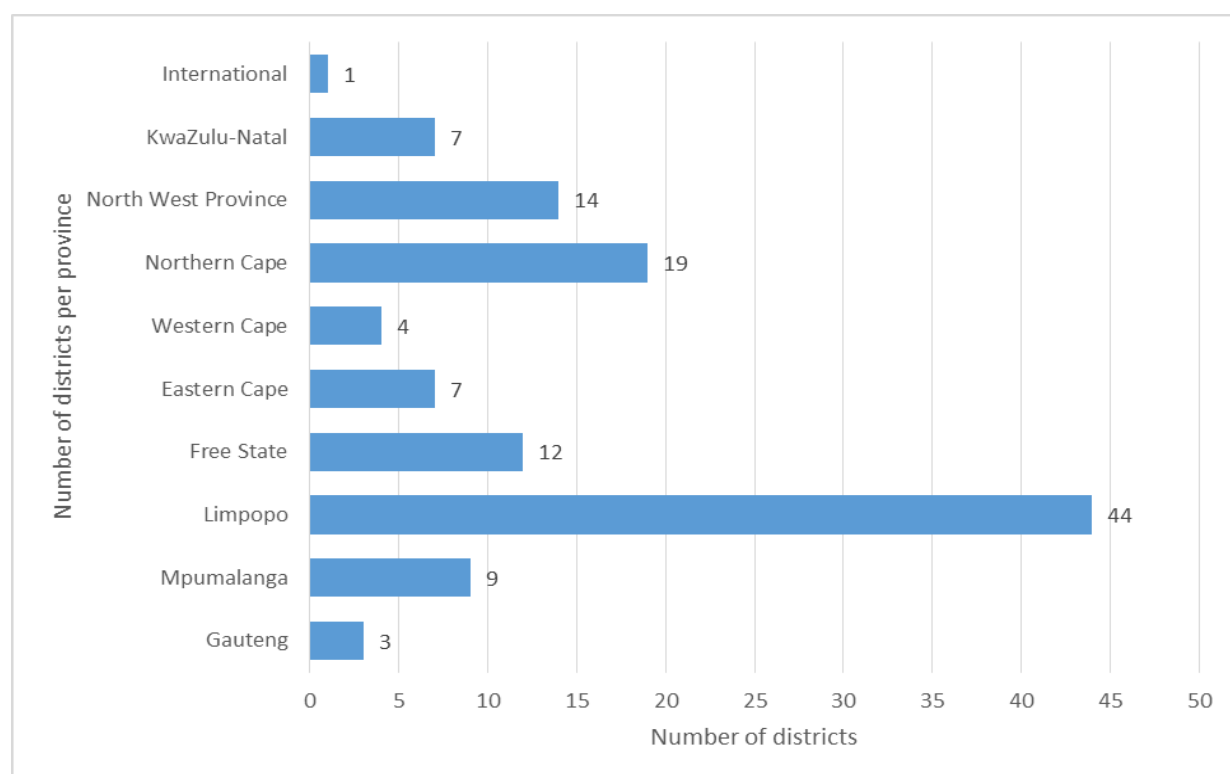


Figure 5.4: Districts in which wildlife establishments are located per province and the number thereof.

In total, the 223 interviewees indicated 114 districts on which private wildlife establishments are located. These districts are provided in the Table 5.2 below indicating the districts per province and the numbers of interviewees.

Table 5.2: District information

Province	District	Interviewee number
Gauteng	Pretoria	58, 68, 70, 71
	Rust De Winter	126
	Vereeniging	81
Mpumalanga	Bethal	190
	Delmas	218
	Loskop	161

Province	District	Interviewee number
	Lydenburg	186, 187
	Machadodorp	188
	Nkama	171
	Vryheid/Chrissiesmeer	185
Limpopo	Alma	72
	Baltimore	37
	Bela Bela	23, 25, 80, 125, 127
	Blouberg	15, 27, 30, 31, 38
	Bulgerivier	57, 61, 62
	Capricorn	87, 96
	Dendron	21
	Dwaalboom	118, 177, 219
	Ellis Ras	169, 180
	Gravellotte	119, 144, 149
	Groblersdal	159, 192
	Koedoeskop	202
	Koedoesrand	20, 22, 28, 51, 54
	Lephalale	41, 52, 102, 151
	Lethaba	73
	Loskop/Groblersdal	165
	Mabula	78
	Madikwe	137
	Marble Hall	189
	Market	158
	Marlboro	205
	Marnitz Kraal	36
	Melk Rivier	223
	Modimolle	69, 115, 117
	Mokopane	67, 84
	MoleMole/Nylstroom	193
	Mopane	92
	Musina	139
	Naboomspruit	129, 138
	Northam	111, 209

Province	District	Interviewee number
	Nylstroom	108
	Overysse	35
	Phalaborwa	167
	Potgietersrus	220
	Roedtan	170
	Rooiberg	133, 136
	Stofberg	91
	Swartwater	3, 4, 8, 10, 11, 13, 14, 17, 19, 29, 32, 33, 34, 53
	Thabazimbi	25, 42, 47, 59, 76, 77, 89, 105, 116, 122, 128, 134, 160, 176, 199, 211
	Vaalwater	65, 121, 148, 166
	Vivo	145
	Warmbad	100, 113, 168, 174, 181, 191
	Waterberg	7, 46, 101, 213
	Not indicated district	63, 124, 195
Free State	Boshof	1, 79, 104
	Brandford	163
	Gariep	86, 153
	Heilbron	55
	Henneman	157
	Hertzogville	215
	Hoopstad	74
	Jagersfontein	109
	Parys	82
	Viljoenskroon	140
	Virginia	64
	Vredefort	200
Eastern Cape	Addo	183
	Cradock	99
	Makany	5
	Somerset East	155
	Uitenhage	120
	Venterstad/Colesberg	154
Western Cape	Baefort West	142

Province	District	Interviewee number
	Boland	156
	Worcester	106
Northern Cape	Barkley West	162
	Colesberg	104, 114, 184, 222
	Delporthoop	130
	Douglas	43, 49, 56, 146, 123
	Griekwa Stad	48
	Hantam Streek	40
	Hopetown	16, 45, 50
	Kimberley	12, 18, 44, 97, 110, 143, 147, 150
	Klaserie	172
	Klerksdorp	9
	Kuruman	26, 60
	Modderrivier	131
	Prieska	39, 182
	Richmond	98
	Schweizer-Reneke	132
	Upington	164, 178
	Vryburg	2
North West	Beestekraal	112, 196
	Botswana grens	175
	Brits	206, 207, 212, 214, 216, 217
	Delaryville	85
	Dewild	208
	Groot Marico	197
	Klerksdorp	203
	Kudusrand	194
	Potch/Ventersdorp	75
	De Rust	198
	Rustenburg	152
	Swartruggens	88, 201, 204
	Thabazimbi	221
	Wolmeransstad	179
	Zeerust	66

Province	District	Interviewee number
		103, 210
KwaZulu-Natal	Hluhuwe	93
	Ladysmith	90
	Manguzi	95
	Mkuze	173
	Pongola	6, 83
	Umkhanyakude	94

The interviewees of wildlife establishments from the Limpopo province are located in forty-three districts or areas within the Limpopo province. This is followed by seventeen districts in the Northern Cape province, fifteen in the North West province, twelve in the Free State province, seven in the Mpumalanga province, six in the Eastern Cape and KwaZulu-Natal provinces respectively, three in the Western Cape province, three in the Gauteng province and one which is outside the boundaries of South Africa – interviewee 135 is from Namibia.

5.3.1.3 Biomes where wildlife establishments are located

There are nine biomes in South Africa that indicate different vegetation types (Rutherford, *et al.*, 2006:31). The biomes, the province in which the biomes are located, the climate that occurs in the biome, the vegetation that occurs in the biome and the animal species that occur in each biome were discussed in chapter 4. In total 237 responses were given as some interviewees indicated more than one biome on their private wildlife establishment. Eleven interviewees did not wish to disclose the biome or did not know. Nineteen interviewees described their biomes as mixed, being mountainous, flat and thorny. In total 207 of the 223 interviewees indicated the biome in which their wildlife establishment is located as per the biomes described in secondary research in chapter 4. Figure 5.5 indicates the biomes in which the private wildlife establishments that were interviewed are located.

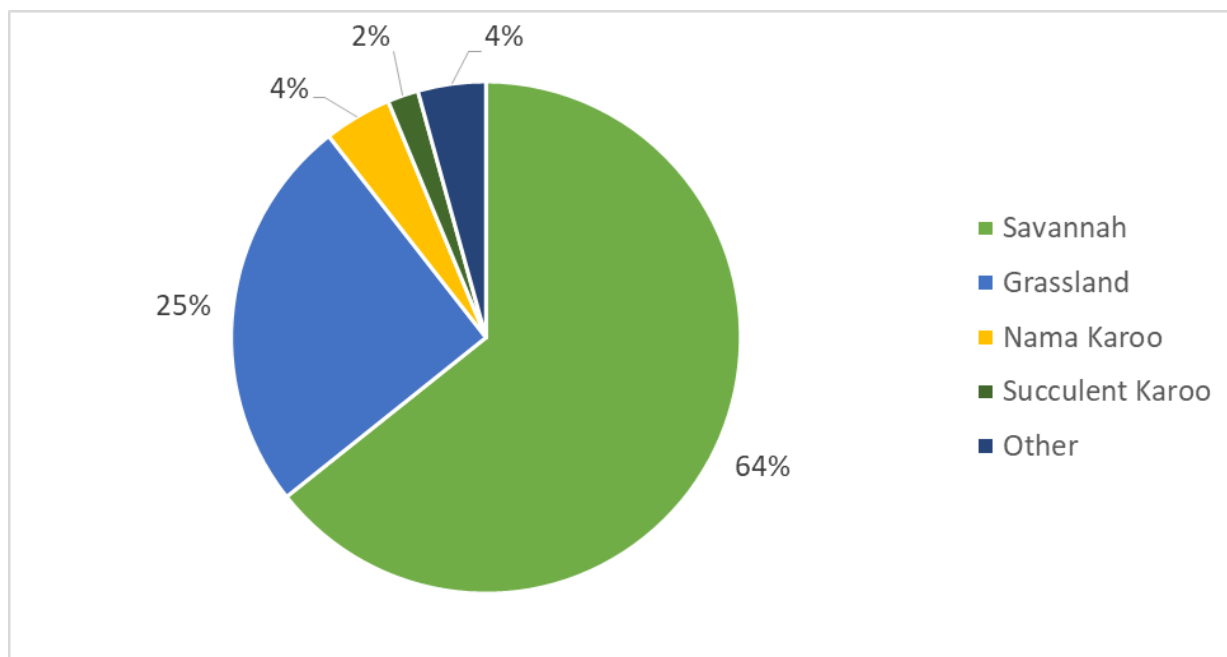


Figure 5.5: Biomes

The largest percentage of interviewees (64%) indicated that their private wildlife establishment is located in the Savannah biome of South Africa. In total, 25% of interviewees' wildlife establishments are located in the Grassland biome, 4% in the Nama-Karoo biome, 2% in a Succulent Karoo biome and 4% consists of other biomes of which less than 1% is a forest and fynbos biome respectively. The veld types of the 'other' biomes are described as mountains and having a lot of thorns. The provincial breakdown of the biomes indicated in Figure 5.5 is indicated in Table 5.3.

Table 5.3: Provincial breakdown of biomes

Province	Number of wildlife establishments per biome					
	Savannah	Grassland	Nama Karoo	Succulent Karoo	Other	
Gauteng	5	5	0	0	0	10
Mpumalanga	2	7	0	0	1	10
Limpopo	107	19	0	0	5	131
Free State	6	9	0	1	0	16
Eastern Cape	1	4	1	0	1	7
Western Cape	0	0	0	1	2	3
Northern Cape	18	12	9	3	0	42
North West	18	6	1	0	3	28
KwaZulu-Natal	7	2	0	0	0	9
TOTAL	164	64	11	5	12	

The fact the research show that there are numerous biomes within a province is consistent with secondary data (Rutherford, *et al.*, 2006:31). The different biomes in each province is discussed next.

- *Gauteng province biomes*

The table indicates that five private wildlife establishments in the Gauteng province operate within a Savannah or 'Bosveld' and Grasslands biome. Grassland biomes occur in the Gauteng region, Savannah biomes to a lesser extent according to the biome map of chapter 4 (Rutherford, *et al.*, 2006:31).

- *Mpumalanga province biomes*

In the Mpumalanga province, two wildlife establishments are located in a Savannah biome and seven in the Grassland biome. This is consistent with secondary data that indicate that the Grasslands biome occurs in the predominant part of the Mpumalanga province (Rutherford, *et al.*, 2006:31).

- *Limpopo province biomes*

In total, 107 wildlife establishments in the Limpopo province are located in the Savannah biome, 19 in the Grassland biome and 5 in other types of biomes – one of which is the Nama Karoo Biome. The Savannah biome is the dominant biome in the Limpopo province followed by Grasslands to a lesser extent. A Karoo biome is not generally associated with the Limpopo province (Rutherford, *et al.*, 2006:31).

- *Free State province biomes*

In the Free State province, six wildlife establishments are located in a Savannah biome, nine in a Grassland biome and one in a Succulent Karoo biome. The Savannah and Grassland biomes are dominant in the Free State province. However, Succulent Karoo biomes are generally not associated with Free State province – the Nama Karoo biome occurs to a lesser extent towards the west and southern parts of the province (Rutherford, *et al.*, 2006:31).

- *Eastern Cape province biomes*

Private wildlife establishments in the Eastern Cape province are located in four different biomes. In the Eastern Cape province, four private wildlife establishments are located in a Grassland biome, one in the Savannah and Nama Karoo biome and one in a Forest biome.

- *Western Cape province biomes*

No private wildlife establishment owners from the Western Cape indicated biomes. Secondary sources have indicated that Fynbos, Succulent Karoo and Nama Karoo are the biomes that occur in the Western Cape province (Rutherford, *et al.*, 2006:31). These biomes were inserted in the table above and included in Figure 5.5. One interviewee (106) is located in the Nama Karoo biome and two are located in an area that is known for Fynbos and Succulent Karoo biomes (142 and 156).

- *Northern Cape province biomes*

Eighteen private wildlife establishments in the Northern Cape province indicated that their private wildlife establishment is located in the Savannah biome. This is followed by nine in the Nama Karoo biome and twelve in the Grassland biome. Three private wildlife establishments are located in a Succulent Karoo biome.

- *North West province biomes*

In the North West province, eighteen private wildlife establishments indicated that they are located in the Savannah biome and six in the Grasslands biome which occurs in the largest part of the province. One interviewee (179) indicated that the private wildlife establishment is located in the Nama Karoo biome which is not a dominant biome in this province (Rutherford, *et al.*, 2006:31). Three private wildlife establishments indicated 'other' biomes or veld types.

- *KwaZulu-Natal province biomes*

In Kwa-Zulu Natal, seven private wildlife establishments are located in the Savannah biome and two in the Grassland biome.

The largest number of private wildlife establishments that formed part of the research are located in the Savannah biome. The Grasslands and Nama Karoo biome are the two biomes in which the second and third most private wildlife establishments researched are located. This gives a clear indication as to which biomes are the most productive or favourite ones for game farms.

5.3.1.4 Location of wildlife establishment

Question 2 related to the reason for choosing the location where the wildlife establishment is located. Interviewees could give more than one reason for choosing a specific location and out of the 223 interviewees interviewed a total of 292 reasons were given. The 292 reasons given were grouped into eight themes. The themes are indicated in Figure 5.6 after which

the individual aspects that comprise the themes as well as the interviewee number and the provinces where the wildlife establishments are located are explained.

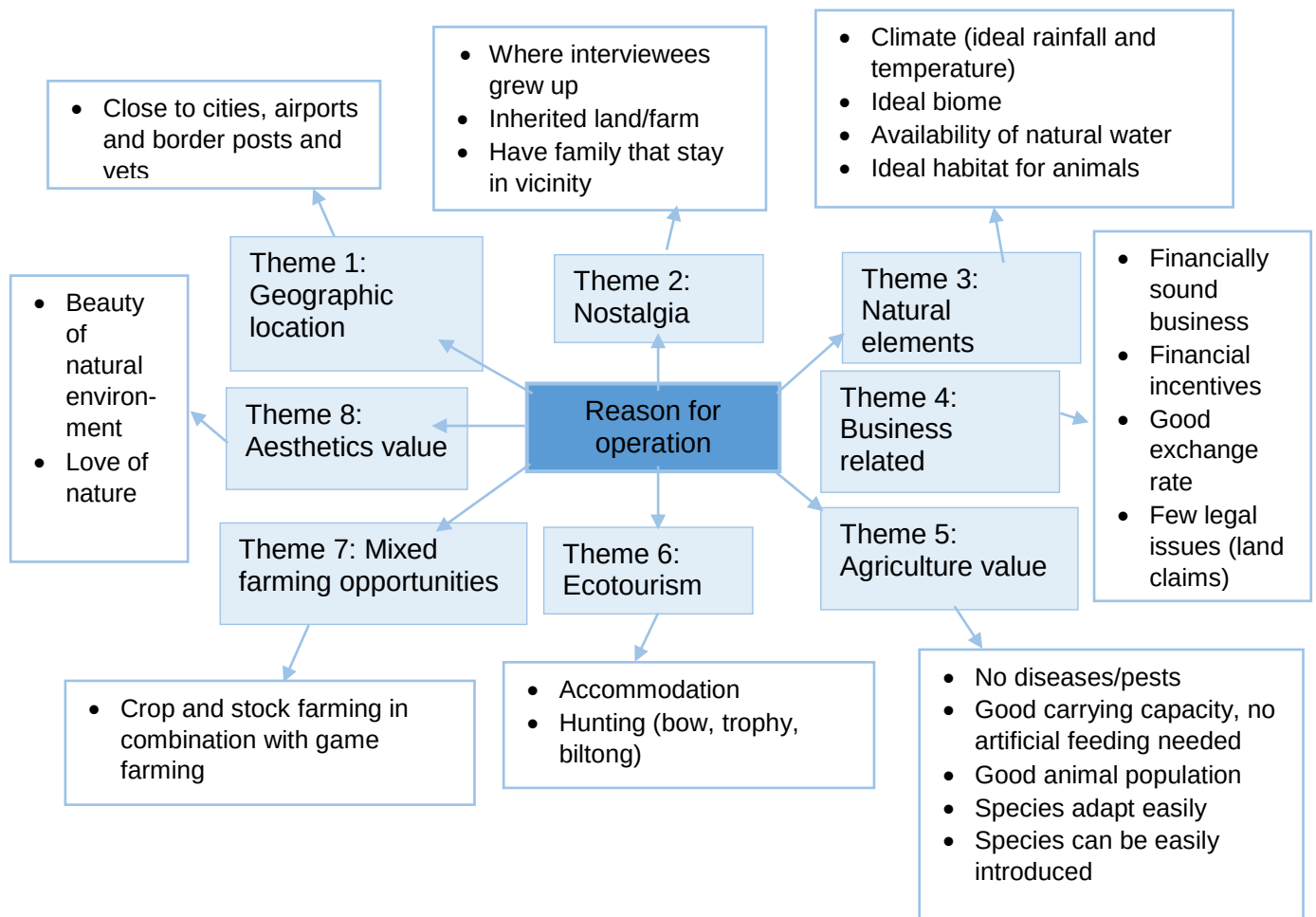


Figure 5.6: Reason for operation

- *Theme 1: Geographic location*

The first theme is geographic location. Geographic location involves the private wildlife establishment being close to cities, airports and border posts. The 68 responses that indicated geographic location as an important reason for the area of operation are interviewees numbered 20-21, 24-28, 38, 41, 46, 51-53, 55-57, 59-60, 67-68, 72, 74, 80-81, 86, 89, 95, 100-101, 105, 109, 112-113, 118, 121, 124-126, 130-131, 133, 141-142, 160-161, 174-175, 180, 187, 191-192, 200-206, 209-211, 214-217. Three of the interviewees were from the Gauteng province, two from the Mpumalanga province, thirty-eight from the Limpopo province, six from the Free State province, one from the Eastern and Western Cape provinces, five from the Northern Cape province, eleven from the North West province and one from the KwaZulu-Natal province.

- *Theme 2: Nostalgia*

The second theme is nostalgia. Nostalgic reasons included interviewees that grew up on the private wildlife establishment, inherited the private wildlife establishment or have relatives that stay in the area. The 61 interviewees indicated that Nostalgia was the reason for the location of the wildlife establishment came from interviewees numbered 4, 10, 11, 15, 16, 19, 30, 32, 35-36, 38, 42- 45, 48-49, 51-52, 54, 77, 82, 87, 102, 104, 106, 110-111, 120, 128, 132, 136, 139-140, 142, 149, 151- 156, 162, 164, 168-169, 171-173, 178-179, 183-186, 188, 213, 218, 220, 223. Four of the interviewees were from the Mpumalanga province, twenty-eight from the Limpopo province, four from the Free State and the Eastern Cape provinces, three from the Western Cape province, fourteen from the Northern Cape province and two from the North West province and KwaZulu-Natal province.

- *Theme 3: Natural elements*

The third theme relates to natural elements. Natural environmental elements included climate (rainfall and temperature), ideal biome, availability of natural water, the habitat being ideal for specific species and good grazing and browsing opportunities for animals. Seventy-seven interviewees indicated that natural elements was the reason for choosing the location of the wildlife establishment is 3, 8, 18, 21-23, 25, 28-29, 31, 37-39, 42, 46, 51-58, 73, 75-76, 78-81, 83-84, 89, 91-92, 96, 107, 116-117, 119, 125, 131, 134, 137-138, 144, 150, 158, 163, 165-166, 180-181, 197, 199, 200, 204 and 220. Fifty-four of the interviewees were from the Limpopo province, one each from the Gauteng and the Eastern Cape provinces, six from the Free State province, three each from the KwaZulu-Natal and North West provinces, six from the Northern Cape province and three from the North West province.

- *Theme 4: Business-related*

The fourth theme is business-related reasons. Business-related reasons included the business doing well financially, financial incentives, good exchange rate, few legal issues (such as land claims) and the interviewee is a vet that forms part of a business model. The twenty-three responses that indicated that business-related reasons were the reason for choosing the location of the wildlife establishment are interviewees numbered 8, 12, 33-34, 41, 43, 50, 53, 55, 68, 93-94, 123, 135, 148, 158-159, 170, 182, 193-195, 198. One response was from the Gauteng province and one from the Free State province. Eleven responses were from the Limpopo province, five from the Northern Cape province and two each from the North West and KwaZulu-Natal provinces. No interviewee gave business related reasons from the Western Cape and Northern Cape provinces and one interviewee's provincial location is unknown.

- *Theme 5: Agricultural Value*

The fifth theme related to agricultural value. Agriculture value included being free of diseases and pests, good carrying capacity, species that don't need artificial feeding, good animal population, species that are easily adaptable and that species can be easily reintroduced. The twenty-seven responses that gave agricultural value related reasons are interviewees numbered 5, 9, 20, 22, 40, 47, 65, 73, 98, 114-115, 127, 129, 143, 145, 148, 150, 152, 176-177, 178, 189, 205 and 222. Eighteen interviewees are from the Limpopo province, one from the Eastern Cape and North West provinces, seven from the Northern Cape province and none from any of the other provinces.

- *Theme 6: Ecotourism*

The sixth theme relates to ecotourism. Ecotourism involves ecotourism accommodation and activities such as bow, trophy and biltong hunting. The eight responses that chose ecotourism as a reason for the location of the wildlife establishments are interviewees numbered 14, 27, 34, 37, 52, 90, 99 and 212. Five of the interviewees were from the Limpopo province and one each from the Eastern Cape, North West province and KwaZulu-Natal provinces. None were from the other provinces.

- *Theme 7: Mixed farming opportunities*

The seventh theme is mixed farming opportunities that include either a change from crop and/or stock farming to game farming or applying both. The nine responses that indicated mixed farming opportunities as a reason for the location of the wildlife establishment are interviewees numbered 6, 17, 53, 61, 85, 103, 157, 146 and 147. Three of the interviewees were from the Limpopo province, one from the Eastern Cape, Western Cape, Northern Cape and KwaZulu-Natal provinces and two from North West province.

- *Theme 8: Aesthetics*

The last theme is aesthetics that includes the peace and beauty of the natural environment and the interviewee's love of nature. The five responses came from interviewees numbered 27, 133, 142, 155 and 221. Two of the interviewees were from the Limpopo province and one each from the Eastern Cape, Western Cape and the North West provinces. None were from any other provinces.

The fact that there are different reasons for the wildlife operation is consistent with that of secondary data that indicates that there are different reasons for owning a wildlife establishment. The reasons include conserving nature, wanting to hunt, enjoying nature, receiving a return on an investment that fall within the subthemes in Figure 5.6. In addition secondary data caution private wildlife establishment owners that a specific piece of land

may not be suitable for all purposes (Ekofokus, 2011:1). Thus the importance of a land-use knowledge described in the rest of this chapter.

5.3.1.5 Business form

Question 3 aimed to determine the type of business form (Figure 5.7).

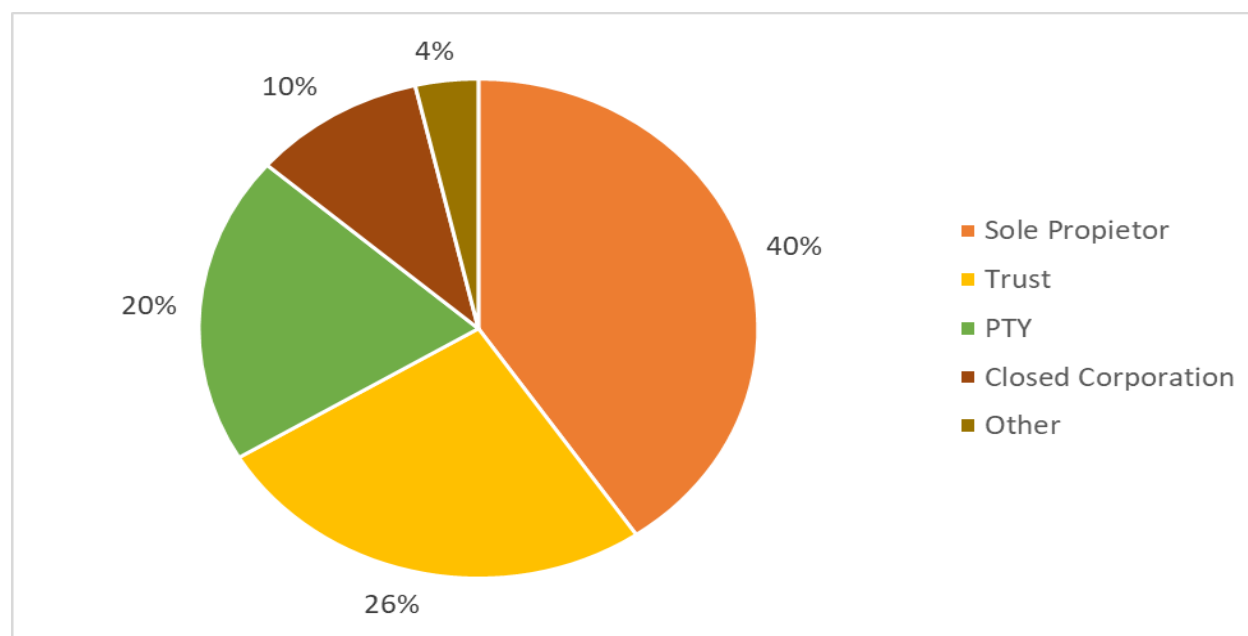


Figure 5.7: Business form

Forty percent (40%) of wildlife establishments' business form is sole proprietor which is the simplest method to register a business as it has few legal requirements (SARS, 2019). This is followed by 26% of businesses being a trust, 20% of being a PTY and 10% being a Closed Corporation. The remaining 4% of interviewees indicated other business forms that were indicated as a partnership or a company.

5.3.1.6 Size of wildlife establishments

Question 4 aimed to determine the size of the wildlife establishment (land size) and the results are indicated in Figure 5.8 below. The average farm size of all the wildlife establishments/farms was 4 744ha. This average farm size is consistent with secondary data that indicate that average farm sizes have grown continuously from 1 640ha in the year 2000 to 2 113ha in 2007 and that the trend continued (Sihlobo, 2018). Out of 223 interviewees, 219 disclosed the size of their farm.

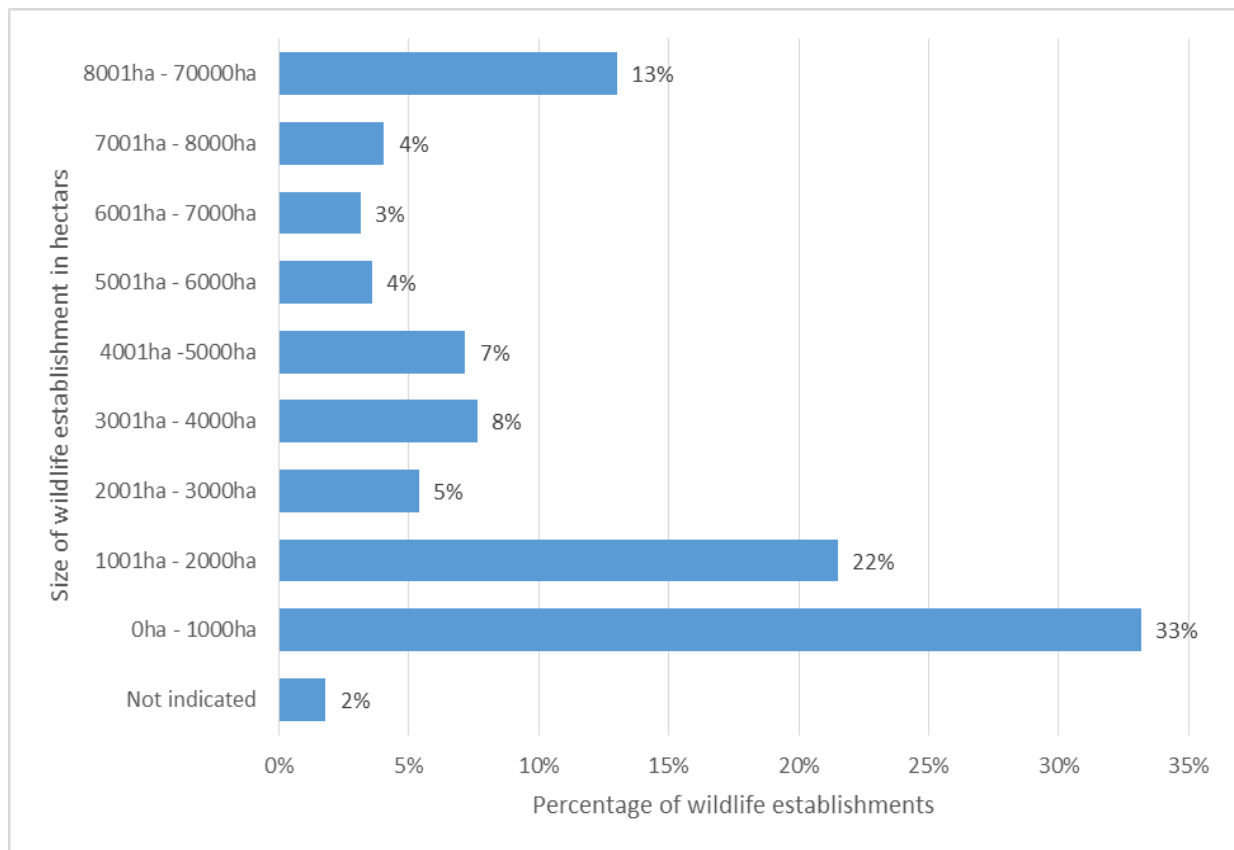


Figure 5.8: Farm size of wildlife establishments

Thirty percent (30%) of wildlife establishments are less than 1 000ha in size, followed by 22% between 1 001ha and 2 000ha and 13% are between 8 001ha and 70 000ha in size. The rest are 4% between 7 001ha and 8 000ha, 3% between 6 001ha and 7 000ha, 4% between 5 001ha and 6 000ha, 7% between 4 001ha and 5 000ha, 8% between 3 001ha and 4 000ha, 5% between 2 001ha and 3 000ha. As the wildlife establishments that are less than a 1 000ha form the greatest proportion, this section will be further broken down and is portrayed in Figure 5.9.

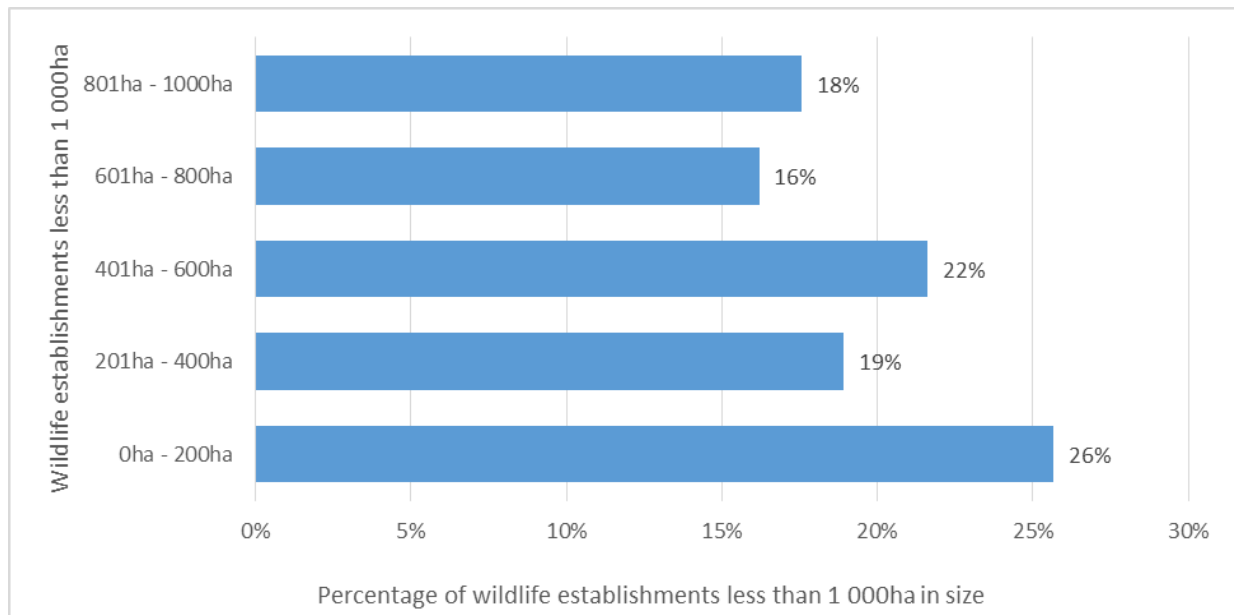


Figure 5.9: Percentage of wildlife establishments less than 1 000ha in size

The largest percentage (26%) of the farms smaller than a 1 000ha falls in the 200ha and smaller bracket. This is followed by 22% of wildlife establishments that are between 401ha and 600ha, 19% that are between 201ha and 400ha, 18% that are between 801ha and 1 000ha and 16% that are between 601ha and 800ha.

5.3.1.7 Species information

Question 5 and 6 were related to species kept on the farm. A full list of species indicated in the research project are listed in Table 5.4 and as part of the interview instrument (Appendix A). The most popular species are indicated in Table 5.4.

Table 5.4: Most popular species kept

Specie	Number of interviewees	Interviewees (%)
Kudu	182	82%
Impala	177	79%
Nyala	157	70%
Duiker (common)	156	70%
Blue wildebeest	151	68%
Gemsbok	137	61%
Blesbok	133	60%
Steenbok	132	59%
Waterbuck	130	58%
Eland	127	57%
Zebra (Burchell's)	126	57%
Springbok	121	54%
Giraffe	111	50%

Table 5.4 highlights the thirteen most popular species kept by 50% or more of the interviewees. The number and percentage of interviewees that own the species are indicated in the second and third columns. The most popular species owned by 82% of wildlife establishment is kudu, followed by impala (79%), nyala and the common duiker at 70% each, blue wildebeest (68%), gemsbok (61%), blesbok (60%), steenbok (59%), waterbuck (58%), eland and Burchell's zebra at 57% each, springbok (54%) and giraffe (50%). These species are also, according to secondary data, species that adapt to the Savannah biome which in section 5.3.1.3 was indicated as the most popular biome (Bothma & du Toit, 2016).

Table 5.5 highlights the average number of popular species that are owned by privately owned wildlife establishments as well as the other species considered in this research study. The information is based on the thirty-nine interviewees that were willing to indicate the number of each specific species on their wildlife establishment. For each species, the number of interviewees that indicated the number of species are given together with the

number of species kept on the private wildlife establishment and the average number species kept on the wildlife establishments.

Table 5.5: Species kept and average number of species kept

	Average number species kept by interviewees	Total number of species kept by interviewees	Number of interviewees that own species
Aardvark	1	21	4
Blesbok	38	1474	26
Blue wildebeest	55	2168	26
Black wildebeest	14	529	10
Bontebok	9	340	7
Buffalo	35	1397	16
Bush pig	2	70	6
Bushbuck	7	307	15
Crocodile	10	10	1
Duiker (common)	5	227	16
Duiker (blue)	6	17	3
Duiker (red)	4	4	1
Eland	25	984	18
Elephant	3	120	1
Gemsbok	52	2016	20
Giraffe	9	344	25
Grey rhebuck	1	45	2
Hippopotamus	1	23	5
Shrp's grysbok	5	200	2
Impala	149	5805	29
Klipspringer	5	180	6
Kudu	46	1913	27
Leopard	2	88	8
Lechwe	7	285	6
Lion	4	155	4
Nyala	28	1173	25
Oribi	4	8	2
Ostrich	12	512	16
Reedbuck	4	160	6
Reedbuck (mountain)	7	302	8

Red hartebeest	13	535	16
Rhino (white)	6	254	4
Roan	28	1169	15
Sable	17	727	13
Springbok	50	2095	18
Steenbok	5	208	10
Suni	3	120	1
Tsessebe	11	453	12
Waterbuck	21	891	25
Zebra (Burchell's)	20	833	22
Zebra (mountain)	1	40	3
Total	17	28 202	

The sum of all species kept is 28 202 on the thirty-nine establishments of interviewees that answered the question. The average number of species kept on the thirty-nine establishments is 688 species of which, on average based on the forty-one species listed, private wildlife establishments own an average of 17 different species. The species with the highest numbers are impala (5 805), blue wildebeest (2 168), gemsbok (2 016), springbok (2 095), kudu (1 913), nyala (1 173) and roan antelope (1 913).

5.3.1.8 Years operational

Question 7 indicated the number of years that wildlife establishments have been operational. Figure 5.10 depicts the results. In total, 218 of the 223 interviewees indicated how long the private wildlife establishment had been operational.

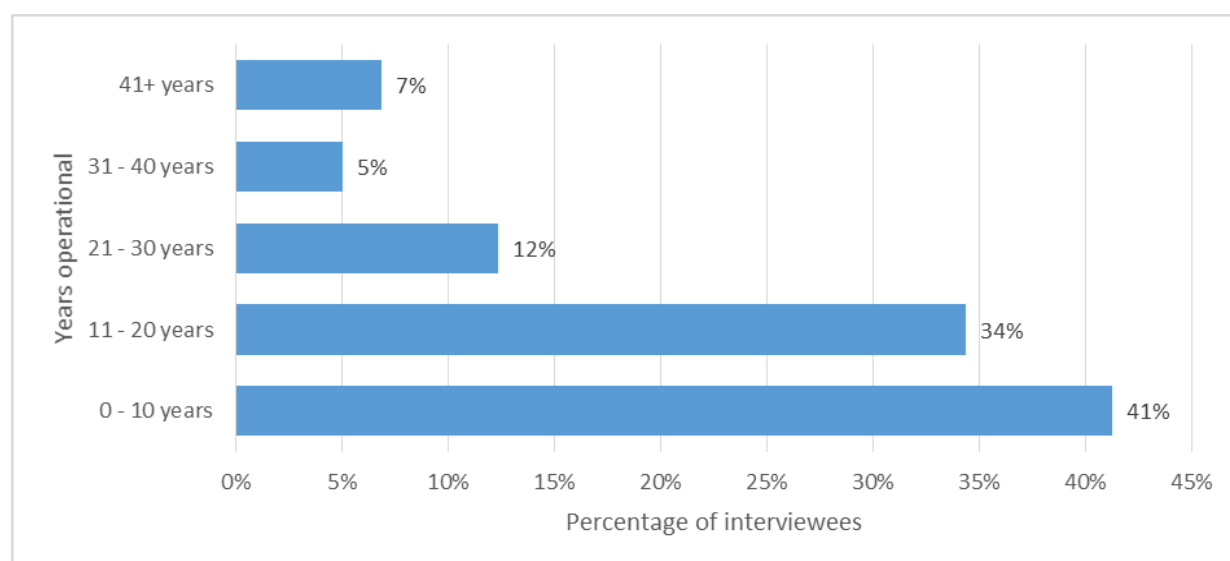


Figure 5.10: Years operational

The average wildlife establishment has been in existence for 17.7 years. The largest percentage of interviewees' establishments (40%) have been operational ten years or less. This is followed by 34% that have been operational for 11 to 20 years, 12% that have been operational for between 21 and 30 years, and 5% that have been operational for between 31 and 40 years and 7% that have been operational for more than 41 years. Only 2% of the interviewees did not indicate operational length.

5.3.1.9 Employee information

Question 8 related to permanent and temporary employees that are employed by wildlife establishments.

- **Permanent employment**

Table 5.6 give insight into permanent employees based on 196 interviewees answers and Table 5.7 gives insight into temporary employees based on 39 interviewees' answers. The total number of permanently employed staff across all categories equals 3 540 employees and temporary employees equalled 242. This gives an average of 18 permanent employees per wildlife establishment/farm. Table 5.6 highlights the different categories of employees that are employed. The number and percentage of interviewees that employ a specific category of employees are indicated in row 1. The average number of employees for each type of employment is given together with the minimum and maximum number of employees that are employed on a wildlife establishment.

Table 5.6: Permanent employees

	Technical	Hospitality & Tourism	Marketing	Housekeeping	Management	Specialised	Security	Taxidermy	Abattoir	Other
Number of interviewees	171	74	78	86	135	80	42	6	20	10
Percentage of interviewees	77%	33%	35%	39%	61%	36%	19%	3%	9%	4%
Total number of employees	1118	929	119	353	280	273	150	58	68	182
Average number of employees	7	13	2	4	2	3	4	10	3	18

Technical employee's duties: In total, 171 interviewees (77%) employ, on average, seven technical employees. Technical duties include game fencing, fire burns, and repairs of equipment.

Ecotourism and hospitality duties: In total, 74 interviewees (33%) employ people for tourism and hospitality-related duties. The private wildlife establishment that indicated the most

ecotourism and hospitality staff (350 employees) is interviewee number 94, which is followed by a private wildlife establishment that employs 200 ecotourism and hospitality employees (interviewee number 90). The third highest number of ecotourism and hospitality employees is 50 employees. The average number of employees employed to conduct ecotourism and hospitality duties is 13 if the private wildlife establishments that employ 350 and 200 employees are included. If these two are excluded, the average drops to 5 ecotourism and hospitality staff. In some cases, housekeeping employees were combined with hospitality employees.

Marketing duties: In total, 78 interviewees (35%) employ, on average, two permanent employees for marketing.

Housekeeping duties: In total, 86 interviewees (39%) employ, on average, four employees for hospitality duties and some interviewees saw housekeeping duties as part of hospitality duties.

Managerial duties: In total, 135 interviewees (61%) indicated that they employ, on average, two employees to conduct managerial duties. In most cases where the number of employees is low the wildlife establishment owners do some of the duties themselves.

Specialised duties: In total, 80 interviewees (39%) employ, on average, three employees to perform specialised duties. Specialised duties involve trackers, professional hunters and wardens.

Security duties: In total, 42 interviewees (19%) employ, on average, four employees for security purposes.

Taxidermy-related duties: In total, six interviewees (3%) employ, on average, ten employees for taxidermy-related duties.

Abattoir-related duties: In total, 20 interviewees (9%) employ, on average, three employees for abattoir-related duties.

Other: In total, 10 interviewees (4%) employ on average 18 employees for other duties. Explanations from private wildlife establishments indicated that the category 'other' involves a combination of the categories of employment – one employee does multiple duties, and the employees are employed as part of mixed farming practices and assist with crop farming duties. In the cases where the number of employees is low, generally one to three, the interviewer indicated that he/she does the duties themselves and does not hire additional people.

- **Part-time employment**

Part-time employees are listed in Table 5.7.

Table 5.7: Part-time employees

	Technical	Hospitality & Tourism	Marketing	Housekeeping	Management	Specialised	Security	Abattoir	Other
Number of interviewees	3	9	7	5	6	5	3	1	28
Percentage of interviewees	1%	4%	3%	2%	3%	2%	1%	0%	13%
Number of employees	4	14	20	8	21	29	3	24	167
Average number of employees	1	2	3	2	4	6	1	24	6

Twenty-three interviewees (1%) indicate that they employ, on average, one employee for technical duties on a part time basis. Nine interviewees (4%) employ an average of two employees for hospitality and tourism duties. Seven interviewees (3%) employ an average of three employees for marketing-related duties. Five interviewees (2%) employ an average of two interviewees for housekeeping-related duties. Six interviewees (3%) employ an average of four employees for managerial duties. Five interviewees (2%) employ an average of six employees for specialised duties. Three interviewees (1%) employ an average of one employee for security reasons and one interviewee employs twenty-four employees to perform abattoir-related duties. In addition, there are twenty-eight interviewees (13%) that employ an average of six employees for other duties not included in these categories.

From the interviews held, it seems that interviewees are more inclined towards permanent employees than part-time employees. The next section focuses on land-use.

5.3.2 SECTION 2: Land-use of private wildlife establishments

Land-use information relates to Questions 9 to 11 in the research interview instrument. In question 10, the interviewees had to indicate total production output regarding the four pillars and mixed farming practices as well as any other activities. In Question 9, information was obtained regarding value-adding activities offered in addition to the four pillars. Question 11 elaborated on breeding practices of private wildlife establishments. Breeding as a land-use activity was elaborated upon since breeding is the pillar that assisted with the growth of the private wildlife industry (Janovsky, 2015:1-2). The results of these three questions are discussed next.

5.3.2.1 Land-use forms and production output

Figure 5.11 indicates the percentage of production output as it applies to the different land-use options.

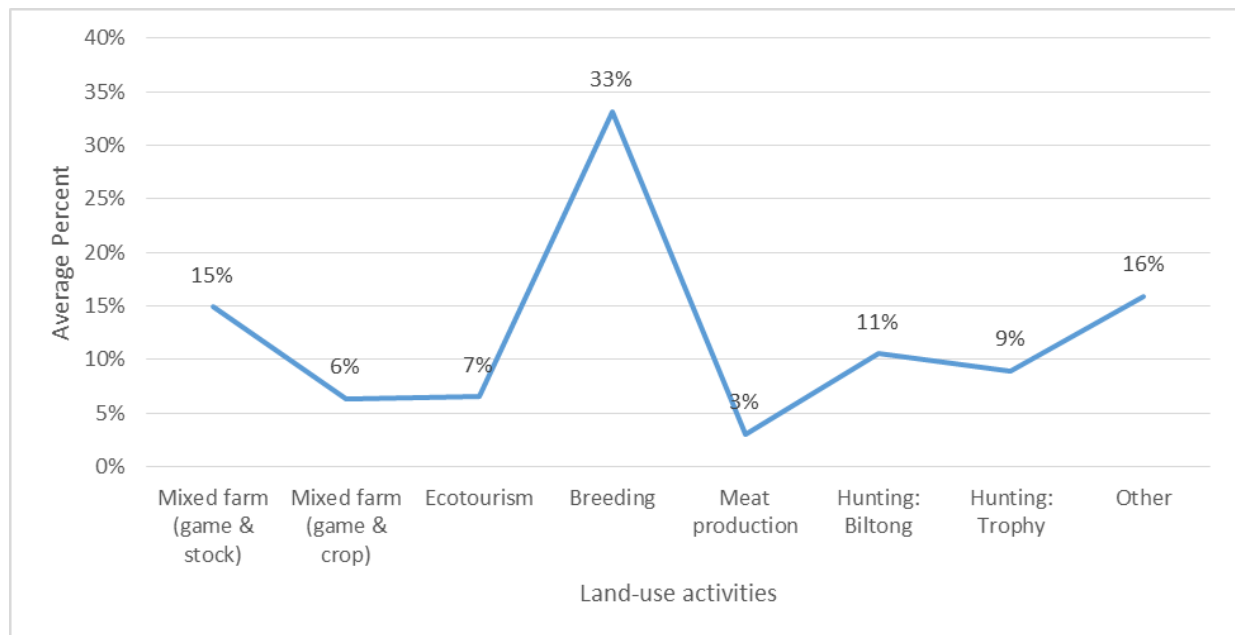


Figure 5.11: Average production output based on land-use activity

The land-use form responsible for the highest production output is breeding with 33%, this is followed by mixed farming (21%) consisting of 15% for game and stock and 6% for game and crop farming. The third highest is hunting with 20% (biltong hunting 11% and Trophy 9% respectively). Seven percent of the production output was due to ecotourism as a land-use form. Game meat had the lowest production output. Even though growth opportunities exist for game meat, possible reasons for the low percentage are a current underdeveloped market that is associated with poor consumer perceptions and legislation that hinders the growth of this pillar (Janovsky, 2015:3). Other land-use forms account for (16%) of production output which include the owner having a construction business, owning game for aesthetic reasons and not focusing on a particular pillar, producing feed and selling hens as well as reasons not indicated by interviewees.

To be able to see how the four main land-use forms perform put together, Figure 5.12 was drafted.

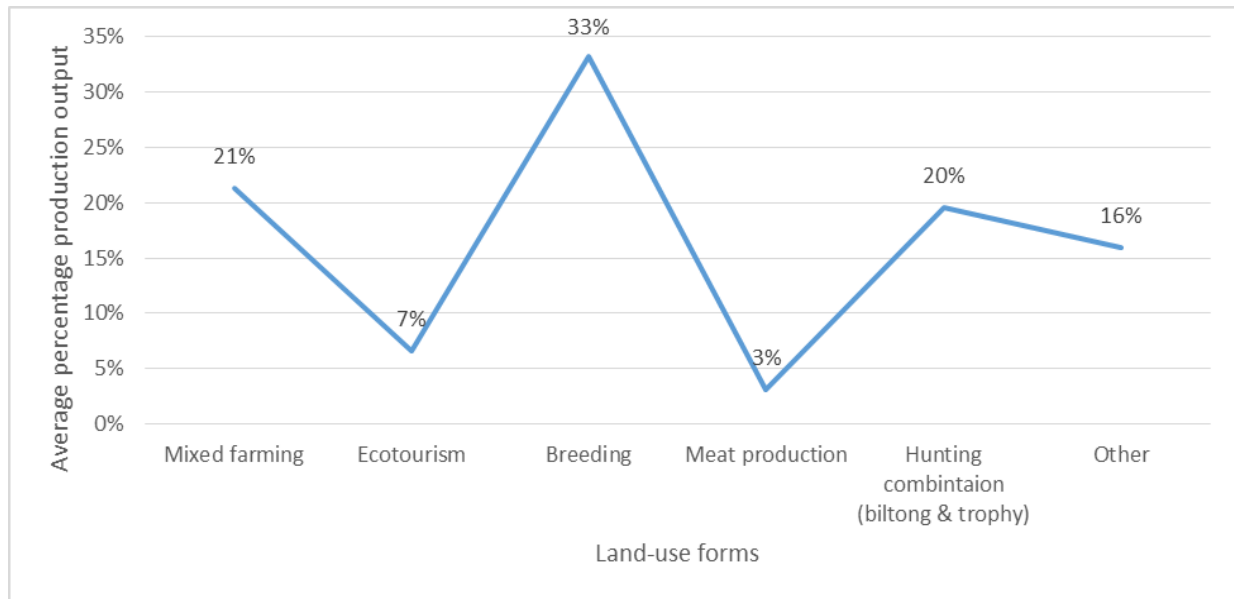


Figure 5.12: Average production output from main land-use forms

In total, 126 interviewees (57%) receive 332% of their production output from breeding. Ninety-three interviewees (42%) receive 20% of their production output from hunting as a land-use form. Seventy-six interviewees (34%) receive 21% percent of their production output from mixed farming. Seventy-one interviewees (32%) receive 16% of their production output from other land-uses that were indicated to include a construction business, owning game for aesthetic reasons, being a veterinarian, beer brewing, not focusing on specific pillars and reasons unknown. Forty-one interviewees (18%) and twenty-six interviewees (12%) receive 7% and 3% of their production output from ecotourism and meat production respectively.

5.3.2.2 Value adding activities

Interviewees were asked to list other value adding activities. Question 11 enquired about value-adding activities offered on wildlife establishments. Value-adding activities identified were events that included weddings, conferences, warrior races, team building events, religious retreats, wine-related activities as well as offering accommodation, training and curio shops. The interviewees that indicated these activities are numbers 81 and 156.

5.3.2.3 Breeding of game species

Question 9 related only to breeding. It was indicated that breeding is the pillar that has grown the most and that can be applied in different ways (Janovsky, 2015:1). Thus breeding is elaborated upon. Of the 223 interviews, only two interviewees indicated that breeding does not form part of their land-use model. This strengthens the reason for this question. In terms of production output (section 5.3.3.1) breeding is the pillar, apart from mixed farming, that received the highest production output. There are different methods by which private

wildlife establishment owners can incorporate breeding. These methods were explained in chapter 2 and Table 5.8 gives a breakdown of how land is utilised for breeding as it relates to breeding high value or plains game.

Table 5.8: Breeding practices

	Total High Value	Total Plains Game	High Value			Plains Game		
			Controlled Environments	Semi-extensive	Extensive	Controlled Environments	Semi-extensive	Extensive
Number of interviewees	175	188	123	25	66	58	39	107
Percentage of interviewees	78%	84%	55%	11%	30%	26%	17%	48%
Average	44	53	25	4	12	14	10	27

In total, 175 interviewees (78%) allocate an average of 44% of their land-use to breeding high value species. A total of 188 interviewees (84%) allocate and average of 53% of their land to breeding plains game. These interviewees indicated whether high value and/or plains game are bred in controlled environment (camps), semi-extensive (large camps that allow for more movement of animals) or extensive environment (no camps – animals can move freely on land).

- ***High value species-breeding***

The total number of interviewees that apply breeding of high value species in controlled, semi-extensive and extensive does not equal that total count of 174 as interviewees could apply more than one of the three options.

In total, 123 interviewees (55%) allocate an average of 25% of their land-use to breeding high value species in a controlled environment. Twenty-five interviewees (11%) allocate an average of 4% of land-use to breeding high value species in a semi-extensive environment and 66 interviewees (30%) allocate an average of 12% of their land-use to the breeding of high value species in an extensive environment. Therefore, the largest percentage of interviewees that breed with high value game was carried out in a controlled environment. Recently, game prices decreased tremendously (Carnie, 2017; Spoorex, 2017), and one would like to see whether this will change the picture. The researcher is of the opinion that this might change drastically in the current environment where game prices are lower, especially colour variants.

- ***Plains game-breeding***

The total number of interviewees that indicated that they allocate land-use to plains game in controlled, semi-extensive and extensive does not equal the total count of 187 as one interviewee may select more than one of the three breeding options.

In total, 58 interviewees (26%) allocate an average of 14% of their land-use to breeding plains game species in a controlled environment. Thirty-nine interviewees (18%) allocate an average of 10% of land-use to breeding plains game species in a semi-extensive environment and seven interviewees (48%) allocate an average of 27% of their land-use to breeding plains game species in an extensive environment.

The largest percentage of interviewees make use of an extensive environment to breed plains game.

5.3.3 SECTION 3: Economics of private wildlife establishments

Economic information relates to Questions 12 to 16 in the interview instrument and aimed to gather information on income and expenditure and past and future investments. Each of the questions is analysed and discussed next.

5.3.3.1 Expenditure based on capital layout per land-use form

Question 16 related to expenditure based on capital layout by land-use form. In Figure 5.13 a breakdown of areas of expenditure is given. The expenditures are categorised based on the four pillars. Breeding is subdivided into three subcategories, high value, plains game and a combination. Mixed farming is divided into two subcategories which are stock and crop farming. By-products are divided into meat production and value-adding products. The other land-use forms are ecotourism and hunting (biltong and trophy hunting).

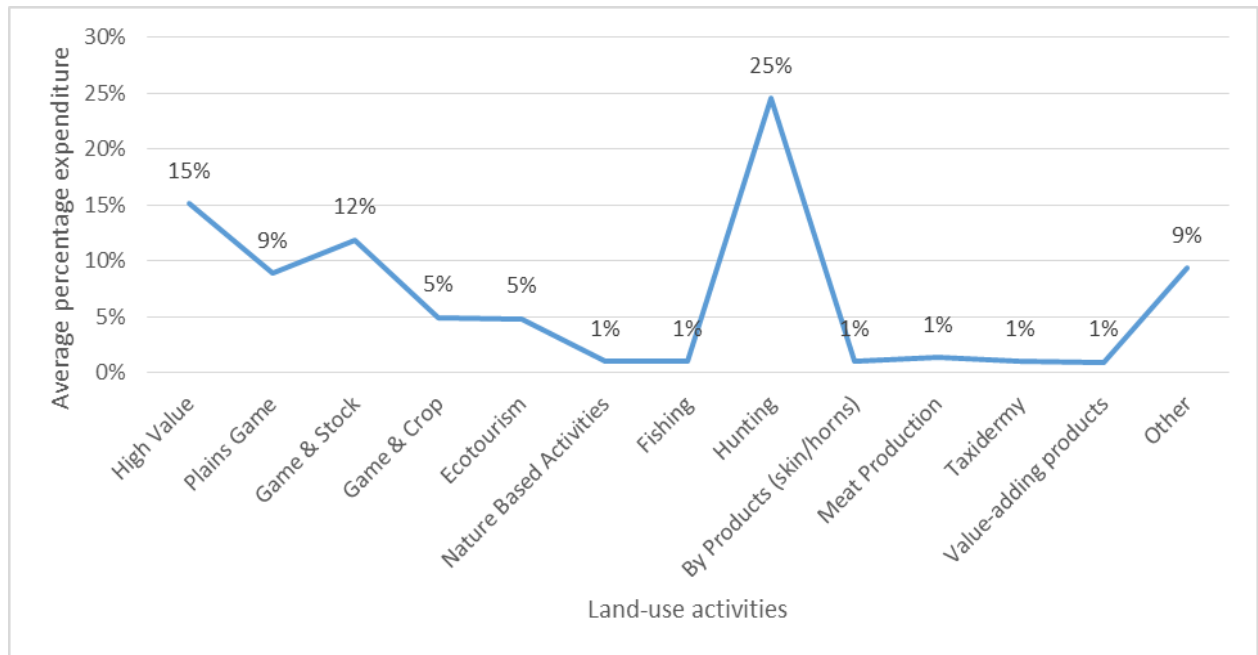


Figure 5.13: Average expenditure of costs based on capital layout per land-use activity

The land-use form that is accountable for the highest expenditure based on capital layout is hunting with 25%. This is followed by breeding of high value game at 15%, mixed farming (stock) at 12% and breeding of plains game at 9%. The rest are all 5% and lower except for other expenses (9%) which are expenses that relate to feed, wood, diesel, buying new animal species and a sheep farm in addition to stock farm expenses.

If the information above is categorised according to the land-use, breeding, hunting, mixed farming, ecotourism and by-products a different picture is revealed as indicated below in Figure 5.14.

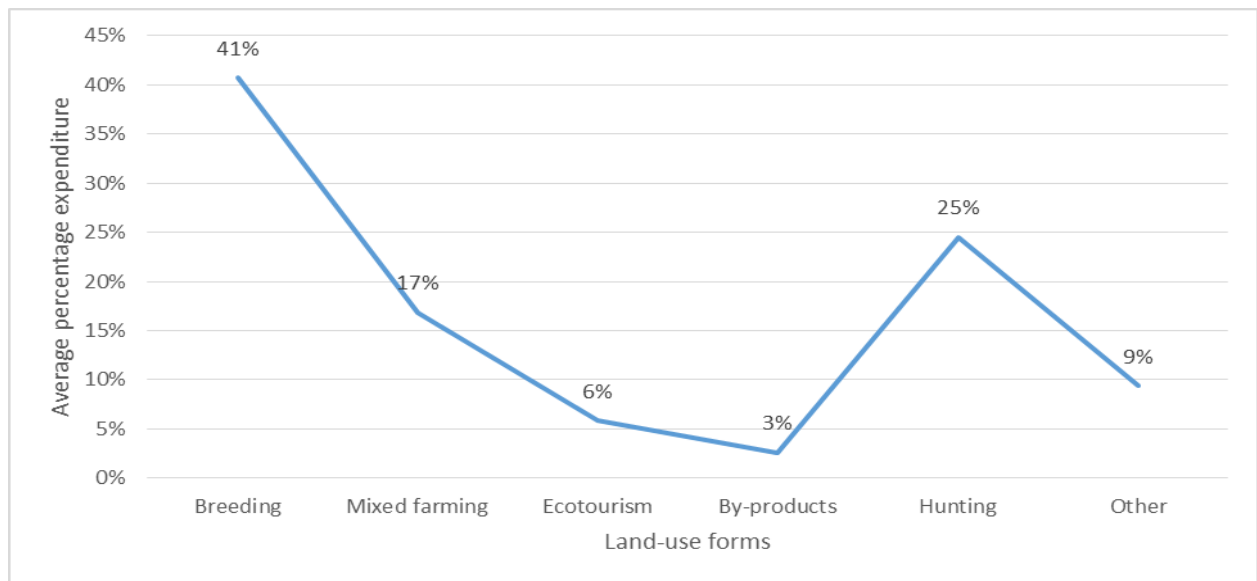


Figure 5.14: Average expenditure of costs based on capital layout per land-use form

These results showed that 129 interviewees (58%) indicated that an average of 41% of expenditure based on capital layout relates to breeding (high value and plains game). Breeding was incorporated into land-use by the highest number of interviewees and has the highest average of all pillars. Second in line is hunting. In total 105 interviewees (47%) indicated that an average of 25% of their expenditure based on capital layout accounts for hunting which includes biltong and trophy hunting. This is followed by mixed farming. In total 55 interviewees (25%) indicated that an average of 17% of expenditure based on capital layout account for mixed farming that included stock and crop farming. In total 35 interviewees (16%) indicated that an average of 6% of expenditure based on capital layout accounts for ecotourism which includes fishing and nature-based activities. In total 19 interviewees (9%) indicated that an average of 3% of expenditure based on capital layout accounts for by-products which includes skin, horn, meat, taxidermy and other by-products or value-added products. Lastly, 39 interviewees (17%) indicated that an average of 9% of expenditure based on capital layout accounts for other land-uses which include wood, feed, diesel, buying new animals and expenses that relate to mixed farming practices not directly relating to stock and crop farming.

5.3.3.2 Capital spent on land, animals and infrastructure

Question 14 related to capital spent on land, animals or infrastructure individually. The information is shown in Figures 5.15 to 5.17.

- *Capital spend on land*

In total 184 interviewees responded to this question.

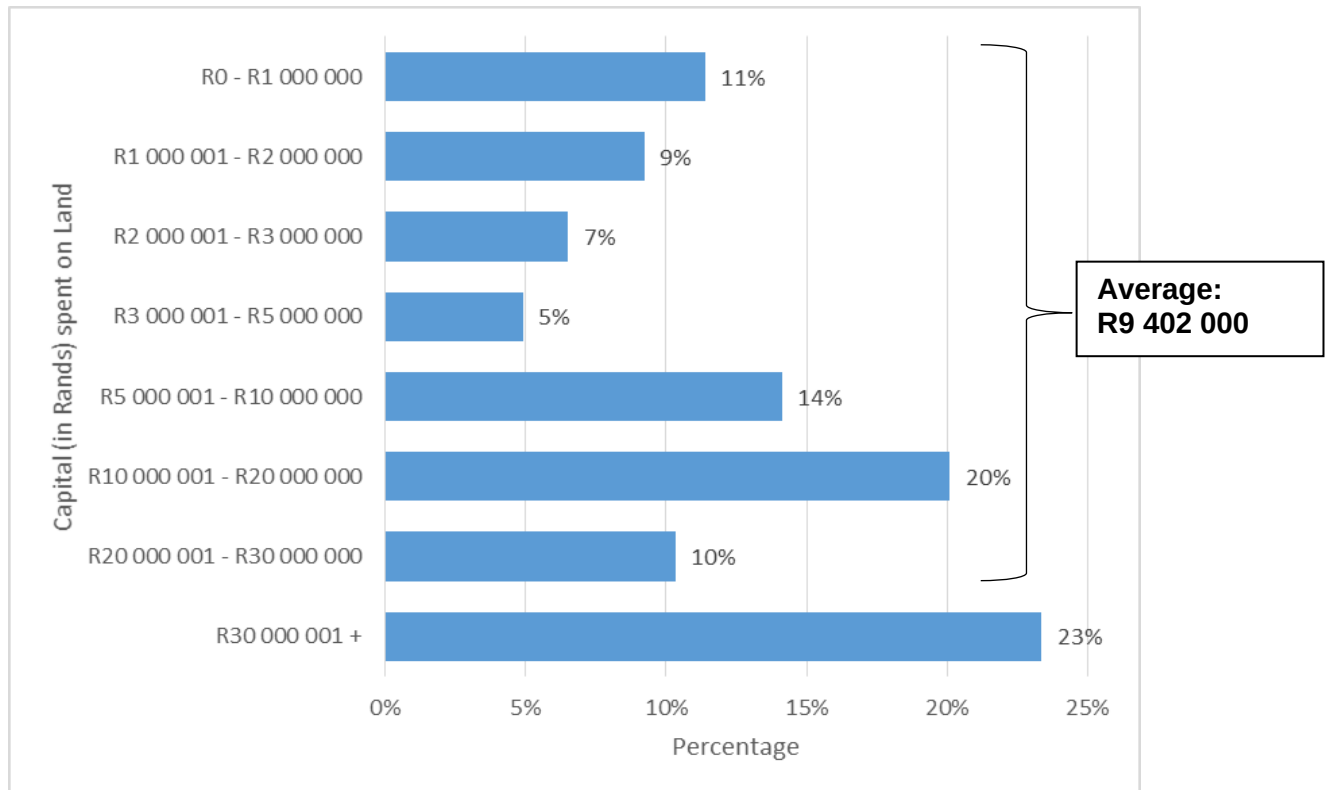


Figure 5.15: Capital spent on land

The largest percentage of interviewees (23%) had spent more than R30 million of their capital on land. This is followed by 20% of interviewees that indicated between R10 million and R20 million and 14% of interviewees who indicated between R5 million and R10 million. This was followed by 11% of interviewees that spent R1 million or less. The rest were all 10% and lower (Figure 5.12).

- Capital spend on *animals*

In total, 197 interviewees responded to this question.

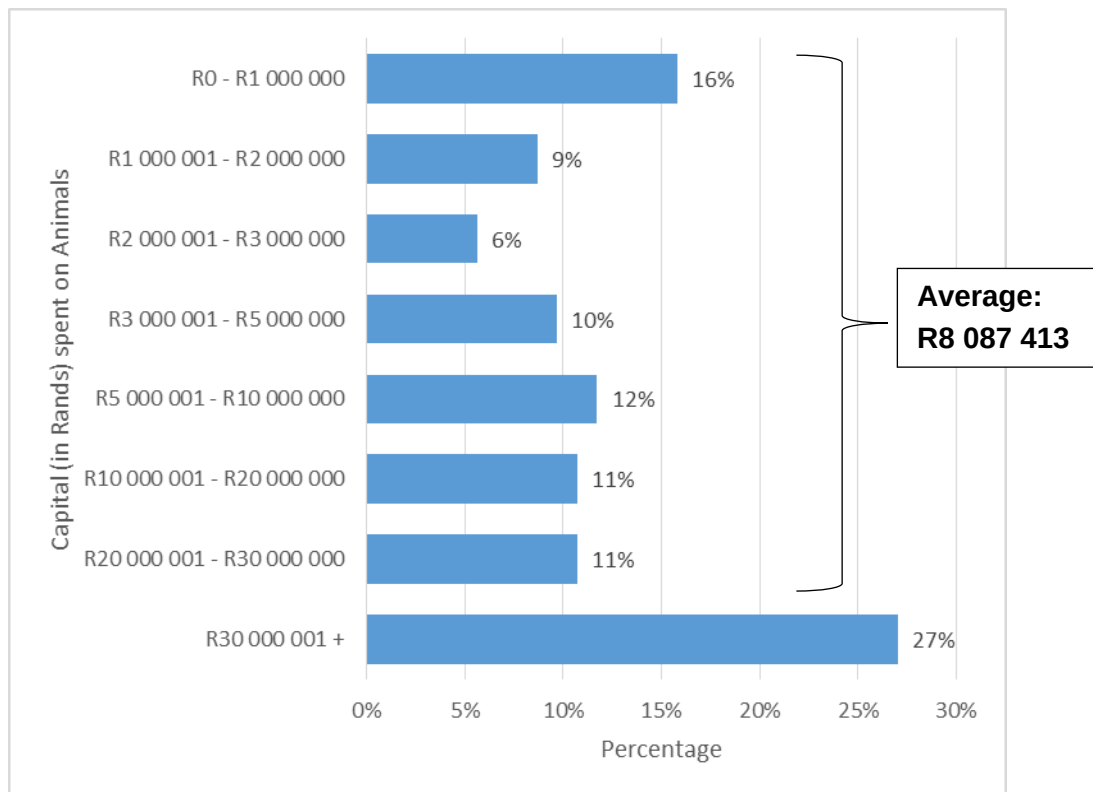


Figure 5.16: Capital spent on Animals

The largest percentage of interviewees (27%) spent more than R30 million on animals and 16% spend R1 million or less on animals. This is followed by 12% that spent between R5 million and R10 million, 11% that spent between R10 million and R20 million and R20 million and R30 million respectively.

- *Capital spend on Infrastructure*

In total, 191 interviewees indicated that capital was spent on infrastructure.

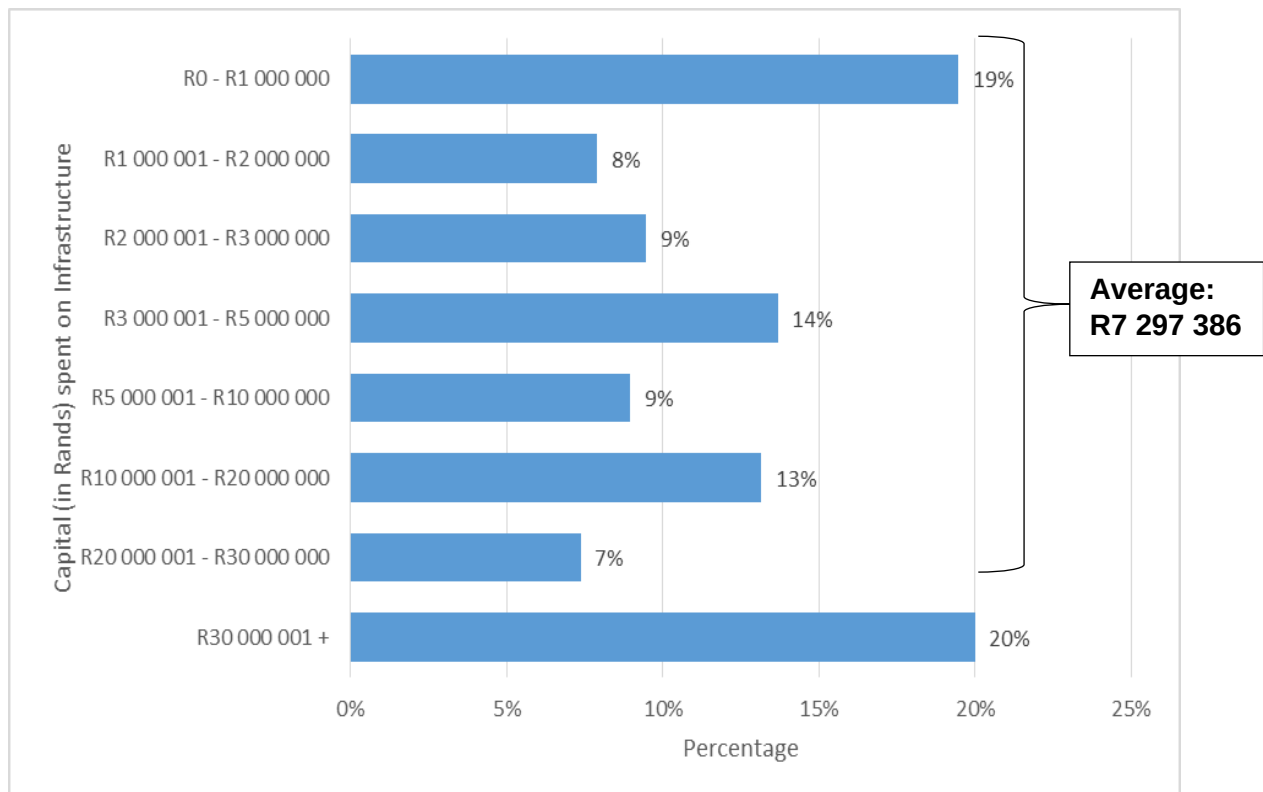


Figure 5.17: Capital spent on infrastructure

In total, 20% of interviewees spent more than R30 million of capital on infrastructure. This is followed by 19% of interviewees that spent less than R1 million. 14% of interviewees spent between R3 million and R5 million on infrastructure and 13% between R10 million and R20 million.

In all three cases, the highest percentage of capital spent was in the over R30 million category. This large amount of capital adds to the economic growth of South Africa. The wildlife industry's contribution to the South African economy has also been indicated by other researchers (Selier & Di Minin, 2015:131)

5.3.3.3 Capital invested in last five years

In Question 15, interviewees had to indicate the greatest capital investment made in the last five years of operations. Of the 223 interviews, 338 responses were received. In total, ten themes were identified that include capital invested in species, infrastructure and facilities, land, breeding, hunting, mixed farming management, ecotourism and other business ventures. The themes are depicted in Figure 5.18.

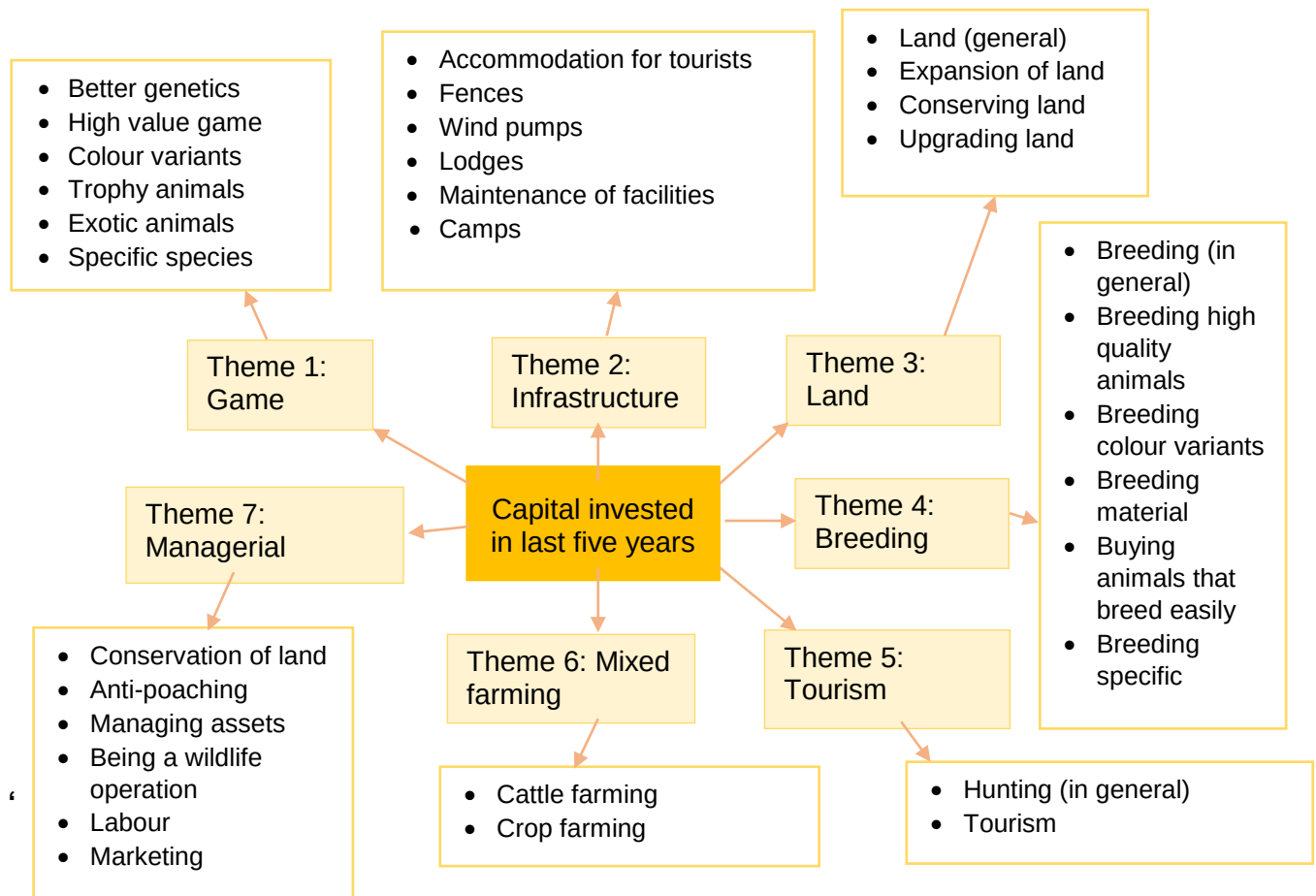


Figure 5.18: Areas in which capital are invested

- *Theme 1: Game*

The first theme in which 119 interviewees indicated they have invested capital in the last five years is game related. Game related investments include investments in animals with better genetics, high value game, colour variants (such as golden wildebeest, black impala), trophy animals, exotic animals and specific species that include buffalo, sable, roan, nyala, rooibok, rhino, crocodile, gemsbok and birds. The interviewees that indicated that they have invested in animal-related investments are 1, 5, 7, 9-16, 18-22, 29, 31, 33-35, 37, 39, 41, 44-45, 47-48, 53, 55-56, 68, 72, 74-75, 77-78, 80, 83, 88-89, 92-93, 96, 98-100, 102-105, 107, 109, 111-116, 118-119, 122, 125, 128-130, 133-134, 137, 139-141, 144-145, 148--152, 157-158, 160-170, 172, 174, 176-178, 180-181, 183-185, 189, 191, 194, 198-199, 206-207, 209, 211-212, 214-215, 218-219, 221. The interviewee provincial breakdown is one from the Gauteng province, three from Mpumalanga and the Eastern Cape provinces, sixty-seven from the Limpopo province, nine from the Free State province, nineteen from the Northern Cape province, eleven from the North West province and two from the KwaZulu-Natal province.

- *Theme 2: Infrastructure*

The second theme in which 53 interviewees indicated they have invested capital in the last five years is infrastructure. Infrastructure investments include investments in tented houses for tourists, fences, wind pumps, lodges, maintenance of facilities, camps, 'spilpunte'. The interviewees that indicated that they have invested in infrastructure and facility investments are 3-6, 8, 28, 30, 32, 35, 38, 41-44, 46, 49, 51-54, 74, 76, 82, 90-91, 98, 100-101, 108, 120-121, 126, 131, 142, 146, 155, 173, 186, 188-190, 193, 196, 200-205, 213, 215 and 222. The interviewee provincial breakdown is one from the Gauteng province, three each from Mpumalanga, Eastern Cape and KwaZulu-Natal provinces, twenty-six from the Limpopo province, four each from the Free State and North West provinces, two from the Western Cape province and six from the Northern Cape province.

- *Theme 3: Land*

The third theme in which twenty-six interviewees indicated they have invested capital in the last five years is land. Land investments include land (in general), the expansion of land, and conserving and upgrading land. The interviewees that indicated that they have invested in infrastructure and facility investments are 29, 30, 40, 51, 65, 78, 81, 85, 95, 97-98, 101, 104, 106, 120, 123, 124, 132, 147, 159, 171, 187, 195, 208 and 221. The interviewee provincial breakdown is one each from the Gauteng, Eastern Cape and KwaZulu-Natal provinces, two from the Mpumalanga province, nine from the Limpopo province, eight from the Northern Cape province and three from North West province.

- *Theme 4: Breeding*

The fourth theme in which twenty interviewees indicated they have invested capital in the last five years is breeding. Breeding investments include breeding (in general), breeding high quality animals, breeding colour variants, breeding material, buying animals that breed easily and breeding of specific species that include sable, nyala, buffalo and roan. The interviewees that indicated that they have invested in breeding are 5, 36, 50, 56, 58, 60-64, 67, 70, 79, 82, 110, 117, 127, 143, 179 and 204. The interviewee provincial breakdown is one each from the Gauteng, Mpumalanga, Eastern and Western Cape provinces, eight from the Limpopo province, four from the Northern Cape province and two each from North West and the Free State provinces.

- *Theme 5: Hunting*

The fifth theme in which 9 interviewees indicated they have invested capital in the last five years is hunting. Hunting investments include hunting in general with no specification as to which type of hunting. The interviewees that indicated that they have invested in hunting are

23-24, 26, 59, 66, 69, 71, 84 and 163. The interviewee provincial breakdown is one each from the Gauteng, Free State, Northern Cape and North West provinces and five from the Limpopo province.

The above two themes (breeding and hunting) relate to two of the four wildlife industry pillars. The only other pillar mentioned by one interviewee (number 94) from the KwaZulu-Natal province, in terms of investment in the last five years, is ecotourism.

- *Theme 6: Mixed farming*

The sixth theme in which 6 interviewees indicated they have invested capital in the last five years is mixed farming. Mixed farming investments includes cattle farming, lemons, crop farming and planting lucerne. The interviewees that indicated that they have invested in mixed farming are 15, 17, 27, 52, 217 and 223. The interviewee provincial breakdown is five from the Limpopo province and 1 from the North West province.

- *Theme 7: Management*

The seventh theme in which 11 interviewees indicated they have invested capital in the last five years is management that impacted business operations that do not form part of the above-mentioned themes. Managerial aspects that led to other investments include conservation, anti-poaching, assets, the decision to buy the wildlife establishment, labour and marketing. The interviewees that indicated that they have invested in managerial aspects are 2, 40, 46, 57, 91, 120, 135, 175, 182 and 216. The interviewee provincial breakdown is three each from the Limpopo and the Northern Cape provinces, one each from the North West and the Eastern Cape provinces and five from the Northern Cape province.

5.3.3.4 Capital income generated from land-use forms

Question 12 related to capital income generated from different land-uses. Figure 5.19 summarises the data.

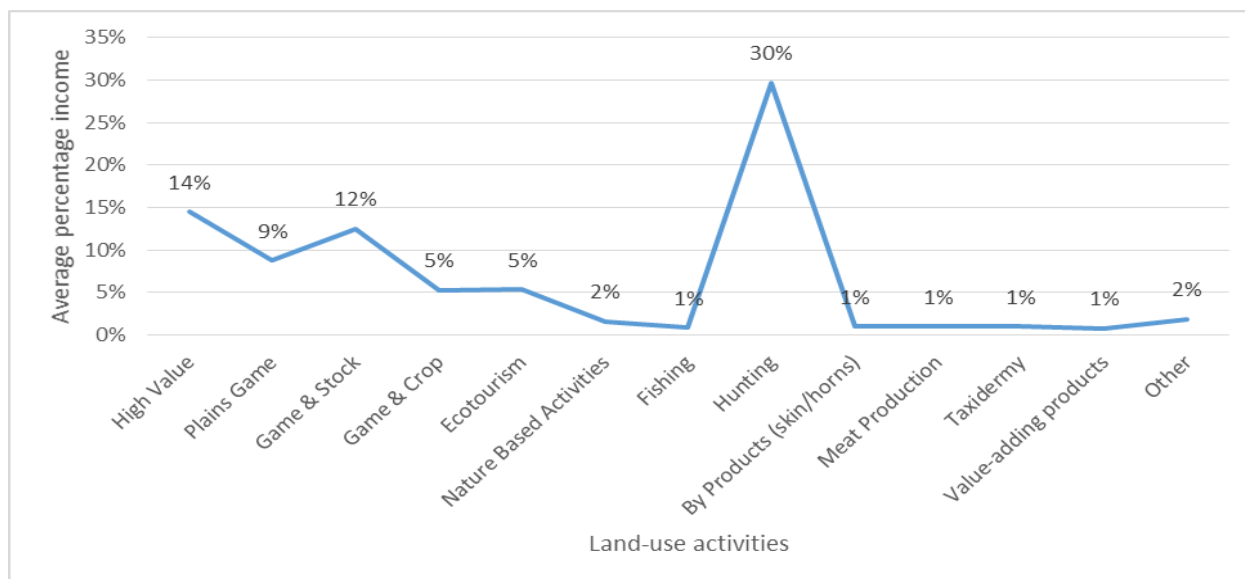


Figure 5.19: Average income generated from landuse forms

The land-use form that is accountable for the highest capital income is hunting with 30%. This is followed by breeding of high value game (14%), stock farming (12%) and breeding with plains game (9%). Other land-uses are responsible for 5% or less of capital income.

If this information is categorised according to the land-uses, breeding, hunting, mixed farming, ecotourism and by-products a different picture is revealed indicated in Figure 5.20.

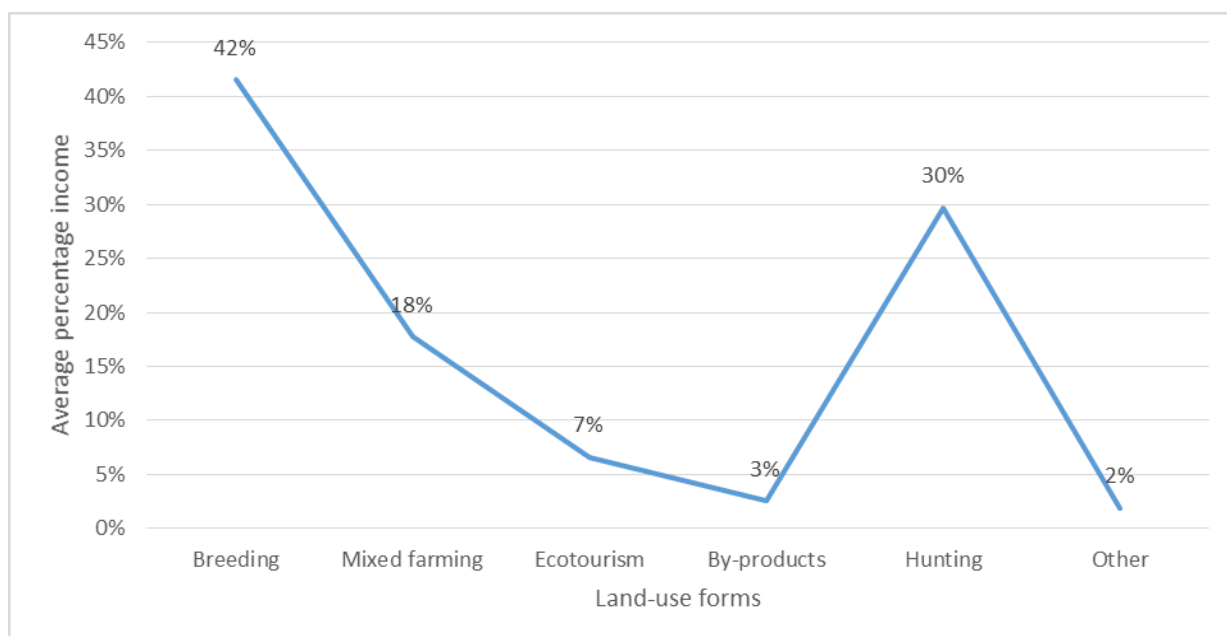


Figure 5.20: Average income generated from land-use forms

The results showed that 134 interviewees (64%) indicated that an average of 42% of capital income generated relates to breeding with high value and plains game. Breeding was incorporated into land-use by the highest number of interviewees and has the highest

average income. Second in line is hunting. In total 125 interviewees (59%) receive 30% of capital income from biltong and trophy hunting. This is followed by mixed farming. In total, 60 interviewees (28%) receive an average of 18% of capital income from mixed farming practices that include, stock and crop farming. In total, 41 interviewees (19%) receive 7% of capital income from ecotourism which includes nature-based activities and fishing. Twenty-four interviewees (11%) receive 3% of capital income from by-products that include skin, horns, meat, taxidermy and other value-adding products. Nine interviewees (4%) receive 2% of capital income from other sources that include owning game for aesthetic value, feed and maintenance, stakeholders and personnel.

5.3.3.5 Return on investment

Question 13 related to factors that could improve return on investment. Out of the 223 interviews came 219 responses. Eight themes were identified that related to the aspects that can improve a wildlife establishment's return on investment. The eight themes are species related, land related, business related, government related, natural aspect, breeding, hunting and ecotourism. The themes are depicted below in Figure 5.21 after which it is explained.

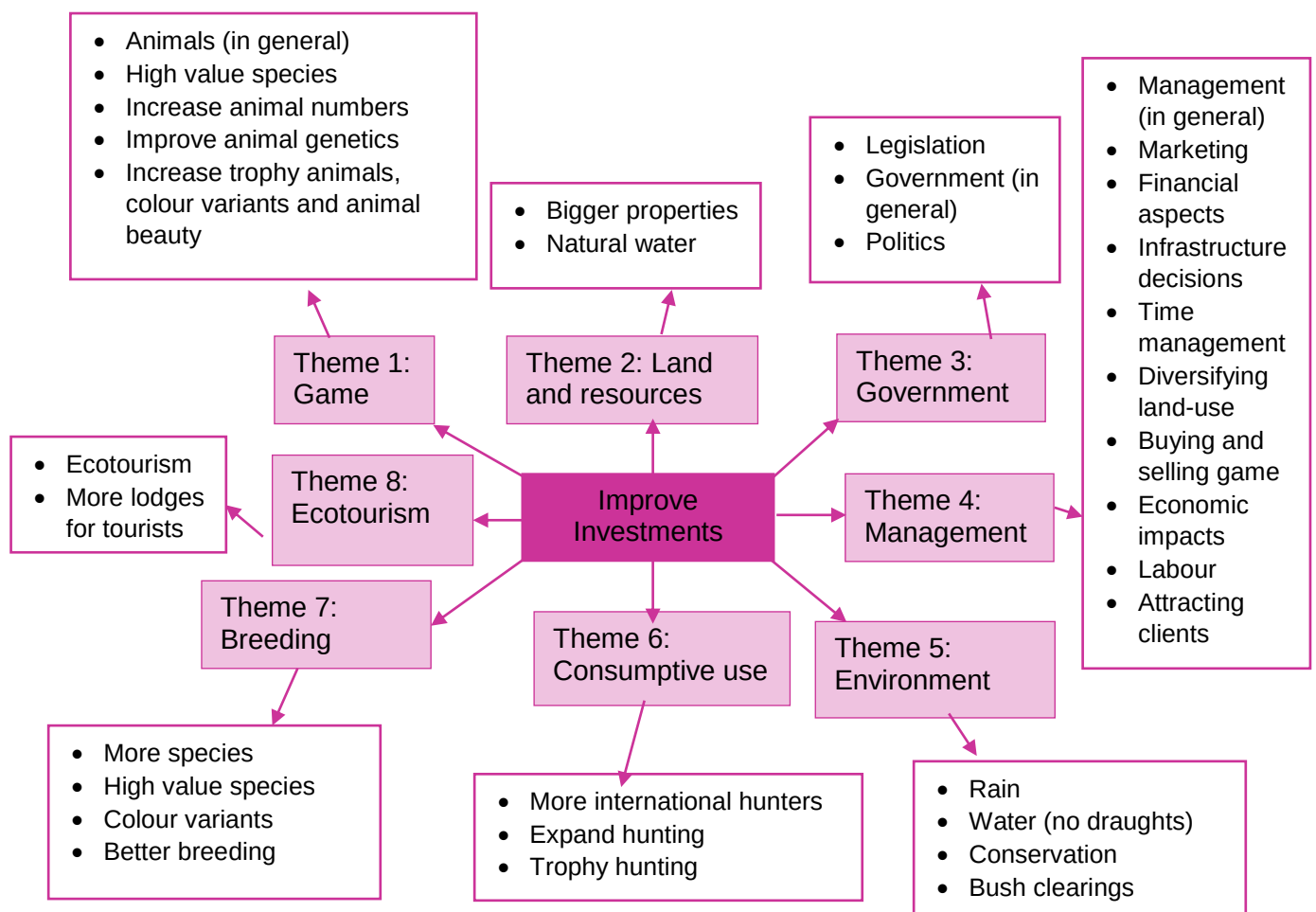


Figure 5.21: Improve investment

- *Theme 1: Game*

The first theme refers to game that includes animals in general, high value species, increasing animals in terms of species and numbers, animal genetics, trophy-quality animals, colour variants and the animals' beauty. The 52 interviewees (24%) that indicated that animals can improve a return on investment are 10-12, 15, 20-21, 26, 47, 49, 53, 63, 72, 79, 89, 92-93, 95, 97, 99, 104, 107, 111, 123, 125, 128, 133, 139-143, 152, 154, 159, 163-164, 169, 176, 178, 184, 186-187, 189-191, 193, 195, 204, 210-211, 215-216. The provincial breakdown of the interviewees is three from the Mpumalanga province, twenty-five from the Limpopo province, four each from the Free State and North West provinces, three from the Eastern Cape province, two each from the Western Cape and KwaZulu-Natal province and nine from the Northern Cape province.

- *Theme 2: Land and resources*

The second theme refers to land and resources that include bigger or more land and owning land with natural water (such as rivers). The 29 interviewees (13%) that indicate that land related factors that can improve a return on investment are 1, 21-23, 25-28, 30, 51-52, 60, 66, 80-81, 88-91, 96-97, 99, 135-136, 155, 169, 175, 181-182, 203. The provincial breakdown of the interviewees include one each from the Gauteng and the Free State provinces, two from the Eastern Cape province, fifteen from the Limpopo province, four from the Northern Cape province and three from the North West province. One interviewee's province is unknown.

- *Theme 3: Government*

The third theme was government related and included legislation, government and politics. The 8 interviewees (4%) that indicated that government can improve a return on investments are 5, 46, 113, 120-121, 151, 174, 180. Six of the interviewees were from the Limpopo province and two from the Eastern Cape province.

- *Theme 4: Management*

The fourth theme is management and includes management (in general), marketing, financial aspects that relate to game, infrastructure decisions (new lodges and roads), time management, diversifying land-use, buying and selling of game, economic impacts on the business, labour and how to attract clients. The 66 interviewees (30%) that indicated that managerial aspects can improve a return on investments are 3, 6, 8, 14, 16, 19, 24, 27, 31, 37-38, 40-41, 50, 54, 56, 61, 66-69, 75, 82, 84-85, 90-91, 96, 100, 102-103, 106, 108, 112, 116, 118-119, 133-135, 140, 147, 152-153, 156-157, 160, 165-166, 169-170, 172, 178-179, 183, 185, 188, 196, 207, 213-215, 217-220. The provincial breakdown of the interviewees

includes three from the Mpumalanga province, thirty-four from the Limpopo province, five from the Free State province, one each from the Eastern Cape and the Western Cape provinces, nine each from the Northern Cape and North West provinces and two from the KwaZulu-Natal province.

- *Theme 5: Environmental aspects*

The fifth theme incorporates the environmental aspects that include rain, water, protect the natural environment, no draughts and bush clearing. The 6 interviewees (3%) that indicated that the environment can improve a return on investment are 15, 17, 40, 65, 73 and 157. The provincial breakdown of the interviewees includes four from the Limpopo province and one each from the Free State and the Northern Cape provinces.

- *Theme 6: Consumptive use*

The last three themes (Themes 6, 7 and 8) relate to three of the four pillars. The first relates to consumptive use that included more international hunters, expand hunting on wildlife establishment and trophy hunting. The 29 interviewees (13%) that indicated that consumptive use can improve a return on investment are 2, 4, 7, 9, 36, 43, 81, 87, 105, 108, 110, 114, 130-131, 137, 140, 144-145, 149-150, 153, 160, 162, 172, 177, 198-199, 206 and 211. The provincial breakdown of these interviewees includes one from the Gauteng, fourteen from the Limpopo province, two each from the Free State and the North West provinces and ten from the Northern Cape province.

- *Theme 7: Breeding*

The seventh theme refers to breeding and includes breeding with more species, high value species, colour variants and breeding 'better'. The 20 interviewees (9%) that indicated that breeding can improve their return on investment are 13, 18, 29, 44, 58, 60, 62, 71, 74, 99, 101, 206, 131, 204, 117, 126, 138, 148, 167, 169, and 206. The provincial breakdown of these interviewees involves two being from the Gauteng province, one each from Mpumalanga, Free State and the Eastern Cape provinces, nine from the Limpopo province, seven from the Northern Cape province and eight from the North West province.

- *Theme 8: Ecotourism*

The last theme is ecotourism that includes incorporating more ecotourism and ecotourism specifically as well as building more lodges to accommodate more tourists. The 9 interviewees (4%) that indicated that ecotourism can improve a return on investment are 9, 45, 57, 94, 101, 140, 145, 173, and 213. The provincial breakdown of these interviewees is three from the Limpopo province, one from the Free State province and seven each from KwaZulu-Natal and the Northern Cape provinces.

5.3.4 SECTION 4: Challenges

Challenges that relate to the industry are tested in question 17 of the interview instrument. The 223 interviewees gave 261 responses. The number of responses is greater than the number of interviewees as interviewees could give more than one answer to the question. After the responses were grouped, eight themes were identified. The eight themes are depicted below in Figure 5.22 after which they are explained.

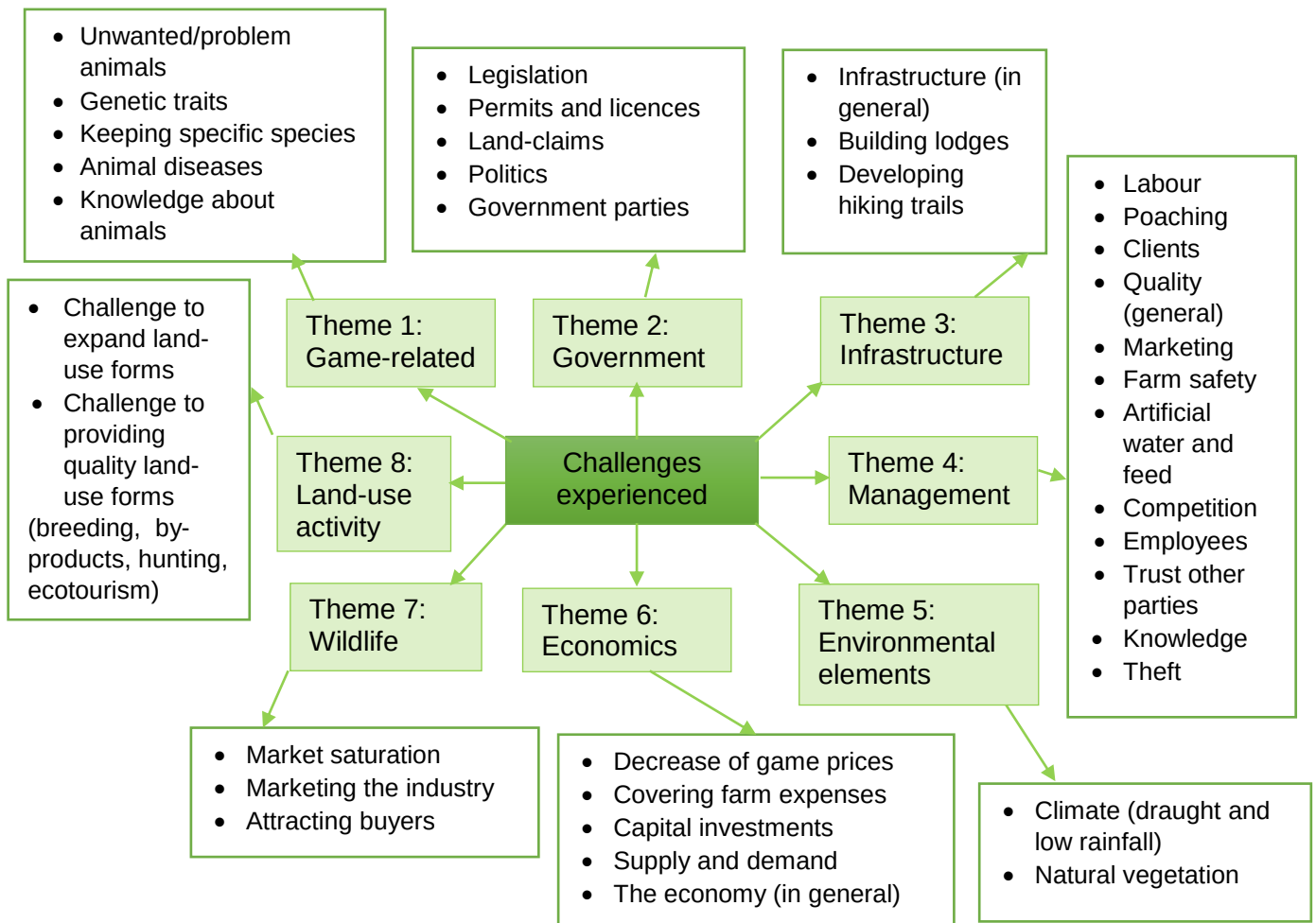


Figure 5.22: Challenges

- *Theme 1: Game-related*

The first theme relates to game that includes unwanted and problem animals (predators that catch game), genetic traits, specific species (leopard, rhino, and buffalo), animal diseases and knowledge about animals. In total, 23 interviewees (9%) indicated that animal related challenges were experienced. These interviewee numbers were 2, 10-11, 13, 48, 52, 92, 108, 120, 138, 160, 166, 175, 178, 181, 190, 193, 195, 211, 213, 218, 222. The provincial breakdown of these interviewees involve two from the Mpumalanga province, fifteen from

the Limpopo province, one from the Eastern Cape province, four from the Northern Cape province and three from the North West province.

- *Theme 2: Government*

The second theme related to government that includes legislation, permits and licences, land claims, politics and government parties. In total, 51 interviewees (20%) indicated that government related challenges were experienced. These interviewee numbers were 5-7, 12, 18, 40, 47, 55, 69, 76, 79-82, 97, 101, 113-115, 118-121, 124-127, 131, 134, 136, 139, 142, 147, 157, 158, 161-162, 171, 174, 177, 180, 184, 186-187, 200-203, 205, 207, 215. The provincial breakdown of these interviewees is two each from the Gauteng and the North West provinces, four from the Mpumalanga province, twenty-three from the Limpopo province, five from the Free State province, three from the Eastern Cape province, one from the Western Cape province, eight from the Northern Cape province and one from the KwaZulu-Natal province.

- *Theme 3: Infrastructure*

The third theme relates to infrastructure that includes infrastructures (in general), new lodges and hiking trails. In total 3 interviewees (1%) indicated that infrastructure related challenges were experienced. These interviewee numbers were 142, 162 and 173. The provincial breakdown of these interviewees is one each from the KwaZulu-Natal, Western Cape and Northern Cape provinces.

- *Theme 4: Management*

The fourth theme relates to management that includes managing labour aspects, poaching, clients, overall quality, marketing, farm safety, managing artificial water and feed, competition, employees, trust of other parties, knowledge and theft. In total, 58 interviewees (22%) indicated that management related challenges were experienced. These interviewee numbers were 3, 5, 8, 12, 14, 16, 26, 31, 39, 45, 49, 54, 56, 62, 65-66, 72-74, 78, 80, 90, 94, 96-97, 99, 102, 106, 112, 116-117, 119, 122-123, 125, 131, 133-134, 137, 140, 145, 151, 155, 157, 163, 165, 167, 171, 175-176, 191-192, 209-210, 212, 217 and 219. The provincial breakdown of these interviewees is one each from Gauteng and Mpumalanga provinces, thirty from the Limpopo province, 4 from the Free State province, three from the Eastern Cape province, twelve from the Northern Cape province, five from North West province and two from the KwaZulu-Natal province.

- *Theme 5: Environmental elements*

The fifth theme relates to environmental elements that include drought, rain (low rainfall) and vegetation. In total 43 interviewees (16%) indicated that challenges were experienced in

terms of environmental elements. These were interviewee numbers 3-4, 8-9, 11, 13, 17, 21, 23-26, 29, 32, 34, 36-38, 41-42, 63-64, 69-71, 73,77-84, 91, 95, 98, 170, 181, 184, 198 and 220. The provincial breakdown of these interviewees was three from the Gauteng province, twenty-nine from the Limpopo province, two each from the Free State and KwaZulu-Natal provinces, one each from the Eastern Cape and North West provinces and four from the Northern Cape province.

- *Theme 6: Economics*

The sixth theme relates to economic challenges that include price drops in colour variants and changes, covering farm expenses, capital investment, economy (in general), supply and demand. In total 42 interviewees (16%) indicated that economic and financial challenges were experienced. These interviewee numbers were 9, 21-22, 27, 28, 33, 35, 36, 38, 52, 53, 55, 65, 75, 77, 79, 82, 85, 88, 100, 101, 107, 108, 110, 111, 115, 130, 132, 135, 144, 146, 148, 149, 164, 172, 178, 179, 182, 199, 206, 208. The provincial breakdown of these interviewees was twenty-two from the Limpopo province, three from the Free State province, one each from the Eastern and Western Cape provinces, eight from the Northern Cape province and four from the North West province.

- *Theme 7: Wildlife industry*

The seventh theme relates to challenges that stem from the wildlife industry that include the seasonality associated with the industry, saturation of the market, marketing the industry, and attracting more buyers. In total, 18 interviewees (7%) indicated that industry-related challenges were experienced. These interviewee numbers were 19-20, 41, 43-44, 46, 50-51, 112, 150, 152, 168-169, 176, 196-197 and 216. The provincial breakdown of these interviewees was eight from the Limpopo province, five from the Northern Cape province and four from the North West province.

- *Theme 8: Land-use activity*

The eighth theme relates to challenges that stem from land-use forms in terms of expansion and quality. In total 21 interviewees (8%) indicated that challenges relating land-use forms were experienced. Interviewees 1, 5, 57, 94 and 150 indicated that expanding ecotourism as part of land-use is a challenge. Interviewees 175, 204 and 19 indicated that expanding hunting as part of land-use is a challenge. Interviewees 57, 70, 93, 117, 141 and 214 indicated challenges with regards to expanding breeding as part of land-use and interviewees 58, 60-61 and 67 indicated that quality breeding is a challenge. Two interviewees, numbers 59 and 102, indicated that quality meat production is a challenge in terms of expansion and of quality. The provincial breakdown of these interviewees is one each from the Gauteng, Mpumalanga, Free State and Eastern Cape provinces, eight from

the Limpopo province, three from the Northern Cape province, four from the North West province and two from the KwaZulu-Natal province.

In the next section, Category 5, Expansion, is discussed.

5.3.5 SECTION 5: Future private wildlife establishment expansions

Information on future expansion relates to question 18 in the interview instrument. In total, eight themes were identified that relate to expansion which includes animal-related, hunting, infrastructure, land, ecotourism, breeding, management and other land-uses. These themes are depicted in figure 5.23 below after which the themes are explained in detail.

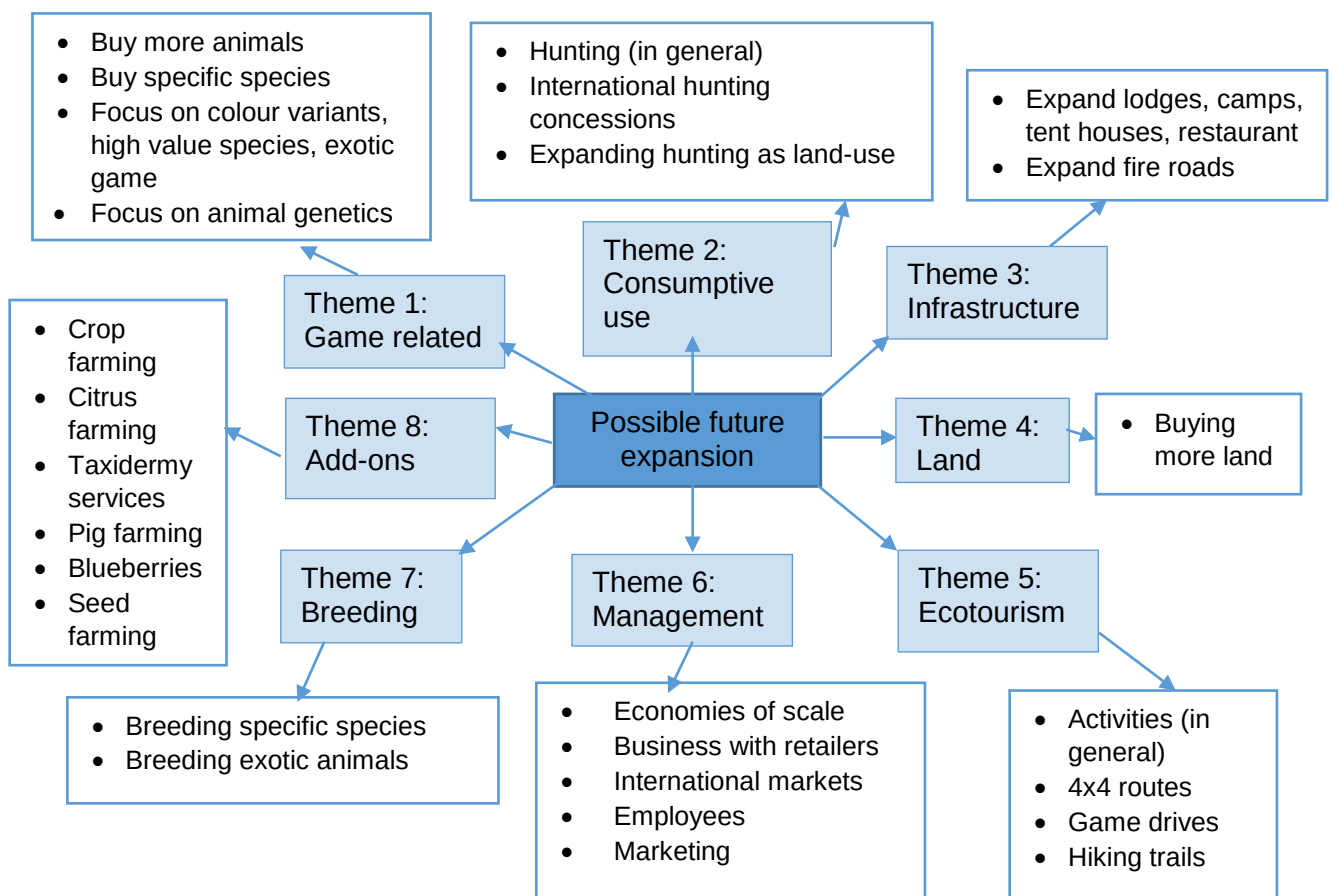


Figure 5.23: Possible future expansion

- *Theme 1: Game related*

The first theme, or possible area of expansion, relates to game. In total, 37 interviewees (19%) indicated animal-related expansion that included expansion in terms of more animals, buying new and specific species (roan, nyala, rhino, buffalo), focusing on colour variants, high value species, exotic game and animal genetics. The interviewee numbers that indicated that they want to expand in terms of game-related reasons are 5, 8, 48, 65, 72, 80, 81, 85, 89, 97, 102, 104, 108, 115, 116, 123, 125, 138, 142, 148, 151, 152, 167, 168, 170,

178, 185, 187, 188, 189, 190, 191, 199, 211, 213, 215 and 220. The provincial breakdown of the interviewees is one each from the Gauteng, the Free State, Eastern Cape, Western Cape and Northern Cape provinces, four from the Mpumalanga province and twenty-one from Limpopo.

- *Theme 2: Consumptive use*

The second theme, or possible area of expansion, relates to consumptive use. In total 36 interviewees (19%) indicated hunting-related expansion that included expansion in terms of hunting (in general), international hunting concessions and expanding hunting. The interviewee numbers that indicated that they want to expand in terms of consumptive use related reasons are 2, 7, 16, 30, 35, 43, 44, 45, 46, 47, 49, 50, 73, 78, 91, 100, 107, 109, 110, 111, 119, 131, 141, 143, 145, 155, 169, 171, 177, 193, 194, 195, 197, 206, 212 and 218. The provincial breakdown of the interviewees were two each from the Mpumalanga and the Free State provinces, sixteen from the Limpopo province, one each from the Eastern Cape and Western Cape provinces, nine from the Northern Cape province and five from North West province.

- *Theme 3: Infrastructure*

The third theme, or possible area of expansion, relates to Infrastructure. In total 31 interviewees (16%) indicated infrastructure-related expansion that included expansion in terms expansion in terms of lodges, camps, tent houses, restaurants and fire roads. The interviewee numbers that indicated that they want to expand in terms of infrastructure-related reasons are 6, 9, 28, 36, 38, 49, 82, 105, 108, 114, 121, 126, 134, 135, 137, 138, 156, 161, 165, 173, 181, 196, 198, 205, 209, 211, 213, 214, 215, 217 and 223. The provincial breakdown of the interviewees was one each from the Gauteng, Mpumalanga and Western Cape provinces, sixteen from the Limpopo province, two each from the Free State and KwaZulu-Natal province, four from the Northern Cape province and four from North West province.

- *Theme 4: Land*

The fourth theme, or possible area of expansion, relates to land. In total, 26 interviewees (13%) indicated land-related expansion that included expansion in buying more land. The interviewee numbers that indicated that they want to expand in terms of land-related reasons are 3, 15, 47, 50, 51, 72, 75, 90, 97, 102, 103, 112, 120, 121, 125, 127, 128, 136, 139, 146, 155, 166, 169, 170, 182 and 183. The provincial breakdown of the interviewees was sixteen from the Limpopo province, three each from the Eastern and Northern Cape provinces, one each from the Western Cape and KwaZulu-Natal provinces and two from North West province.

- *Theme 5: Ecotourism*

The fifth theme, or possible area of expansion, relates to ecotourism. In total, 17 interviewees (9%) indicated ecotourism-related expansion that included expansion in ecotourism activities, 4x4 routes, game drives and hiking trails. The interviewee numbers that indicated that they want to expand in terms of ecotourism-related reasons are 26, 33, 36, 38, 43, 45, 54, 95, 101, 124, 140, 143, 150, 157, 179, 200 and 203. The provincial breakdown of the interviewees was six from the Limpopo province, three from the Free State province, four from the Northern Cape province, two from North West province and one each from the Western Cape and KwaZulu-Natal provinces.

- *Theme 6: Management*

The sixth theme, or possible area of expansion, relates to management. In total, 17 interviewees (9%) indicated management-related expansion that included expansion in managing economies of scale, business with retailers, international markets, employees, marketing, staff. The interviewee numbers that indicated that they want to expand in terms of management-related reasons are 14, 19, 27, 47, 82, 88, 113, 119, 144, 147, 156, 160, 161, 170, 174, 177 and 193. The provincial breakdown of the interviewees was twelve from the Limpopo province and one each from Mpumalanga, Free State, Western Cape, Northern Cape and North West provinces.

- *Theme 7 Breeding:*

The seventh theme, or possible area of expansion, relates to breeding. In total, 12 interviewees (6%) indicated ecotourism-related expansion that included expansion in breeding with specific species (such as buffalo, roan, nyala) and exotic animals. The interviewee numbers that indicated that they want to expand in terms of breeding-related reasons are 70, 73, 79, 87, 91, 93, 117, 138, 148, 158, 168 and 208. The provincial breakdown of the interviewees was eight from the Limpopo province and one each from Gauteng, the Eastern Cape, North West and KwaZulu-Natal province.

- *Theme 8: Add-ons to existing land-use*

The eighth theme, or possible area of expansion, relates to other add-on land-uses. In total, 13 interviewees (7%) indicated other land-use-related expansion that included expansion in crop farming, citrus farming, taxidermy services, pig farming, blue berries or seed farming. The interviewee numbers that indicated that they want to expand in terms of other add-ons to land-uses are 10, 15, 17, 20, 22, 51, 118, 132, 169, 172, 184, 201 and 210. The provincial breakdown of the interviewees was nine from the Limpopo province and two each from Northern Cape and North West provinces.

5.3.6 SECTION 6: Suggestions from the industry

Other suggestions by interviewees relate to Question 19 in the interview instrument. Interviewees 31, 34, 45, 50 and 199 suggested that knowledge is important. Interviewee 31 suggested *'that nature must be appreciated'*, interviewee 48 suggested working hard and interviewee 114 said it was important to stay positive. Interviewee 32 suggested having alternative incomes. Interviewee 80 suggested that marketing is important and interviewee 33 suggested that the sustainability of the market must be tested. Interviewee 46 said that private wildlife establishment owners must understand the legalities of imports and exports and interviewees 113, 142, 144, 174 and 215 indicated that government should play a more active role. It was also suggested, by interviewee 105, that there *"should be more focus on overseas hunters"*, interviewee 107 suggested focusing on quality genetics and interviewee 121 suggested focusing on quality in general. It was also suggested by interviewees 113 and 198 that entering the industry at the right time was important. Once 'in' the industry, interviewee 150 indicated that *"reputation is important"* and interviewees 145 and 175 suggested that *"those in the wildlife industry must be accommodating to others in industry"*. Lastly, interviewees 211, 213 and 217 suggested *"to consider the species bought"*, *"veld management"* and *"to plant feed for animals bought"* respectively.

5.4 LAND SIZE VERSUS AVERAGE LAND-USE

The following section will compare the size of the farm to average land-use by considering different land-use forms, hunting, breeding, ecotourism and by-products as well as mixed farming and other land-uses in terms of the average production output, total income generated and expenditure based on capital layout. Each figures' percentages will not total 100% as each calculation is based on a separate calculation of how size of land compares with a specific pillar. This section summarises the results.

5.4.1 Size versus land-use forms based on average production output

Figure 5.24 determined the average production output of interviewees per pillar (breeding, ecotourism, hunting, by-products and mixed farming) and other land-uses compared to the size of the land. Land size was divided into four categories, <500 ha, 501-1 000 ha, 1 001 – 3 000ha and >3 001 ha.

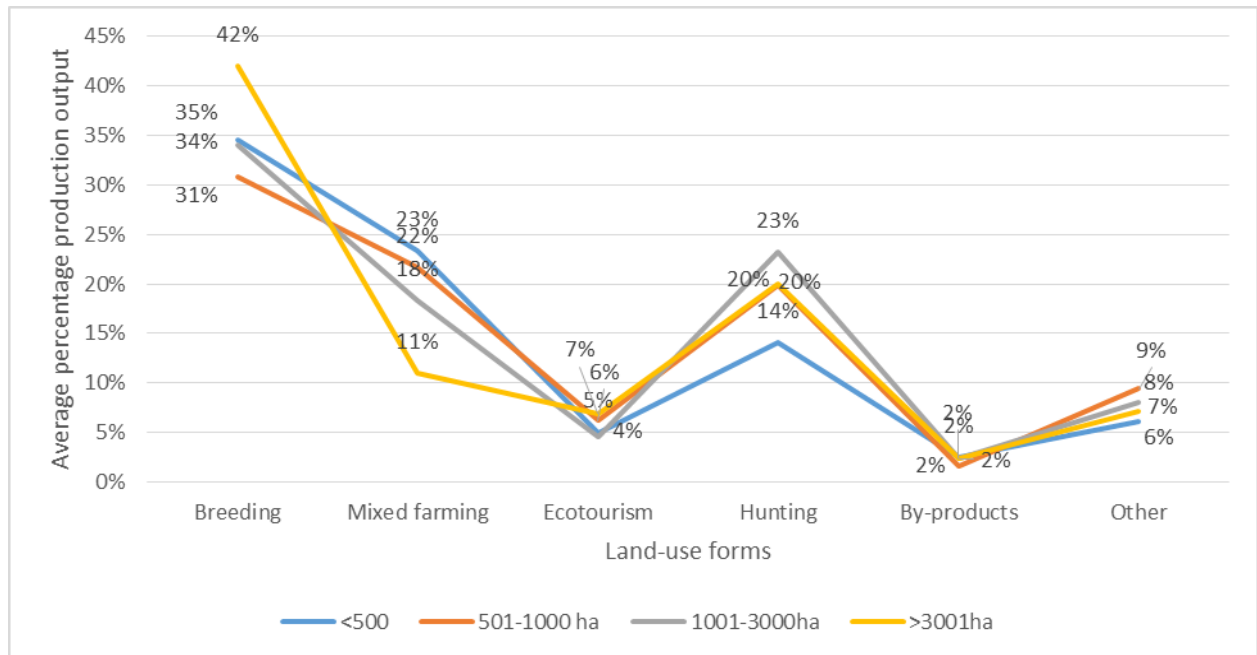


Figure 5.24: Average size versus average production output per land-use form

An average of 37% of the production output for game farms >3 001ha are due to breeding. This was followed by hunting which is responsible for 26% of the average production output. Mixed farming was responsible for the highest average production output for farms smaller than 500ha (38%) and farms between 501 to 1 000ha (32%). Hunting is also responsible for a higher average production output on larger farms, 26% for >3 001ha and 14% for farms between 1 001 and 3 000ha. Percentages allocated to other land-uses include accommodation, feed, maintenance and employee-related aspects (wages and labour in general). Considering this information that stems from Figure 5.24, it becomes apparent that the highest average production output comes from breeding and hunting, especially on large land. As the size of land decreases, the average production output from these two land-use forms also decreases. The opposite is true for mixed farming where the average production output increases as the size of land decreases. Thus, the land-use (production output) of smaller land sizes is more focused on mixed farming practices. Ecotourism and by-products have the lowest combined average production output but, again, the highest (9%) for farms >3 001ha. Other aspects include the interviewee owning a construction business, owning stock that is not farmed for commercial purposes and owning game for aesthetic reasons that do not relate to a specific pillar.

5.4.2 Size versus average expenditure based on capital layout

Figure 5.25 depicts the average expenditure based on capital layout of interviewees per pillar (breeding, ecotourism, hunting, by-products and mixed farming) and other land-uses based on the size of the land.

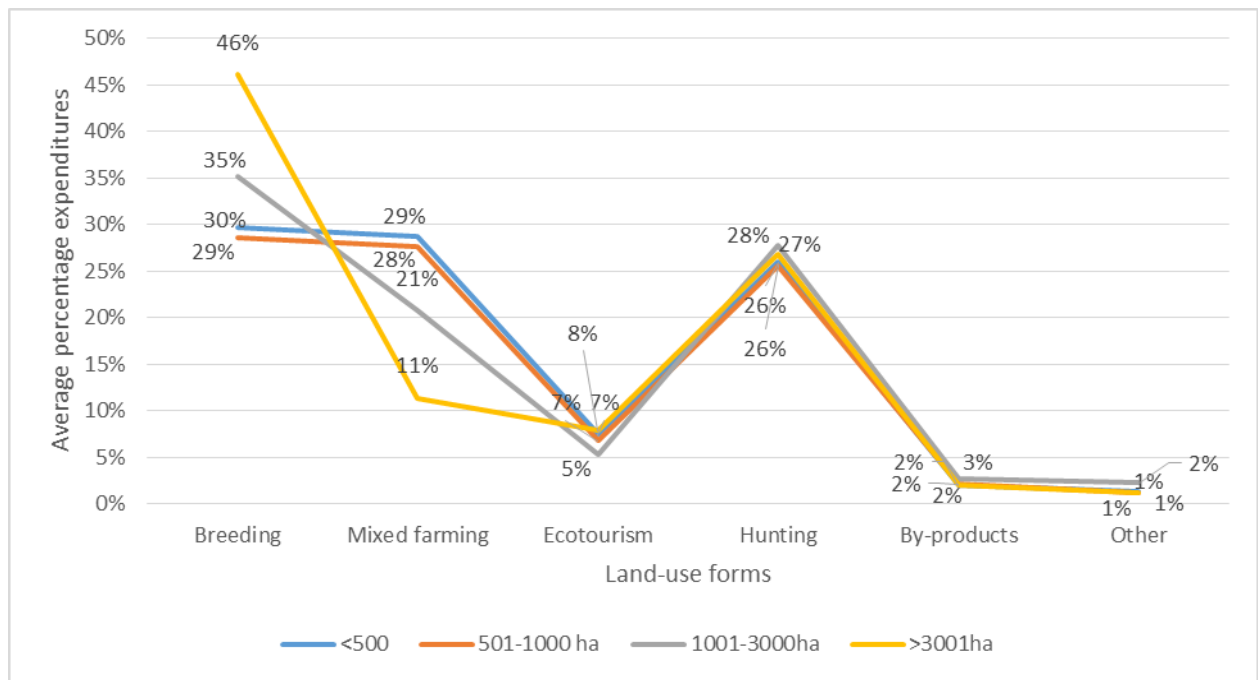


Figure 5.25: Size versus average expenditure per capital layout per land-use form

Overall, breeding has the highest average expenditure based on capital layout – for all four land size categories. Farms larger than 3 001ha had the highest average expenditure for breeding. The highest average expenditure based on capital layout for hunting equals 23% that stem from farms between 1 001 and 3 000ha. The highest average expenditure based on capital layout for mixed farming stem from farms smaller than 500ha. The data shows that, as farms increase in size, the average expenditure based on capital layout decrease for mixed farming. From figure 5.25, it is clear that for all farm sizes the highest expenditure is due to breeding and hunting. Again, the results show that smaller farms (<500ha and 501-1 001ha) have a higher expenditure on mixed farming than larger farms. Other expenditure based on capital layout stem from buying feed, paying wages, accommodation, wood and diesel.

5.4.3 Size versus average income generated

Figure 5.26 considers the average income generated by interviewees per pillar (breeding, ecotourism, hunting, by-products and mixed farming) and other land-uses based on the size of the private wildlife establishment.

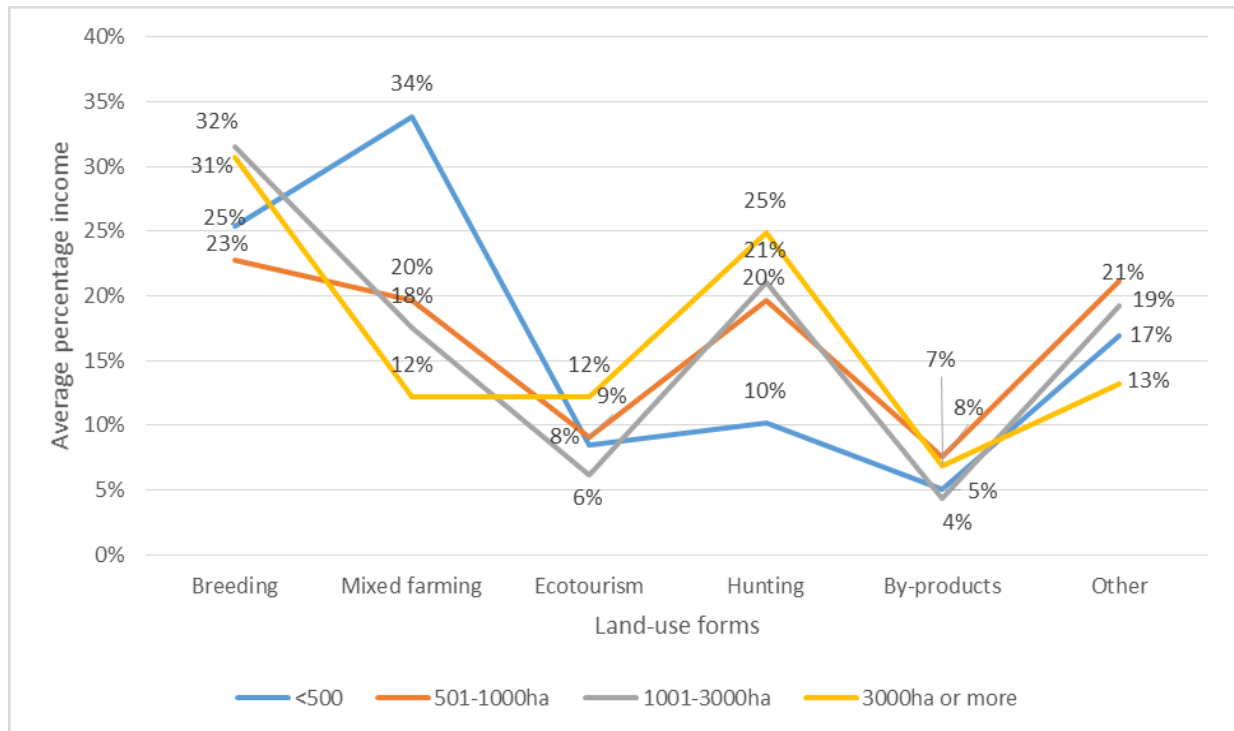


Figure 5.26: Size versus average income generated per land-use form

The highest average income generated from breeding is 46% on farms 3 001ha and larger and farms 1 001-3 000ha (35%). Smaller farms, less than 500ha, generate the highest average income from mixed farming. As the size of farms of which mixed farming forms part of land-use increase, the average income from mixed farming decreases. It is interesting to note that, for all land sizes, there is little difference between the average income generated from ecotourism, hunting and by-products. Income generated from other land-use forms includes food, maintenance and hens that are not considered as part of stock farming practices.

Considering the information given in Figures 5.24, 5.25 and 5.26, in all three cases breeding has the highest averages for production output, expenditure based on capital layout and income generated. This is followed by hunting. In addition, as the size of land becomes smaller the percentage averages in all three cases decrease for these two pillars. The opposite is true for mixed farming where smaller farms show the highest averages for production output, expenditure based on capital layout and income. This suggests that as the size of land increases, other land-uses are incorporated into land-use, such as breeding and hunting which can increase the average production output and income generated as well as expenditure based on capital layout. The size of land has very little to no effect in terms of the average production output, income generated and expenditure based on capital layout for ecotourism, by-products and other land-uses. In all cases, the average percentage allocated to these three aspects is low (7% for ecotourism, 2% for by-products and 8% for

other land-uses). Thus there is no clear relationship to size in terms of production output, income generated or expenditure based on capital layout. In all three cases, the average land-use allocated to by-products is extremely low. This offers an opportunity to expand by-products as a pillar, especially in terms of game meat that, as per chapter 2, is estimated to grow in future. Lastly, based on the data discussed in section 5.3 and 5.4 that indicate the importance of mixed farming, it becomes apparent that mixed farming can be seen as a fifth pillar, especially for small farms less than 1 000ha.

5.5 PROVINCIAL LAND-USE BREAKDOWN

The section that follows focuses on data breakdown per province for land-use. Figure 5.27 gives a summary of the information discussed per province.

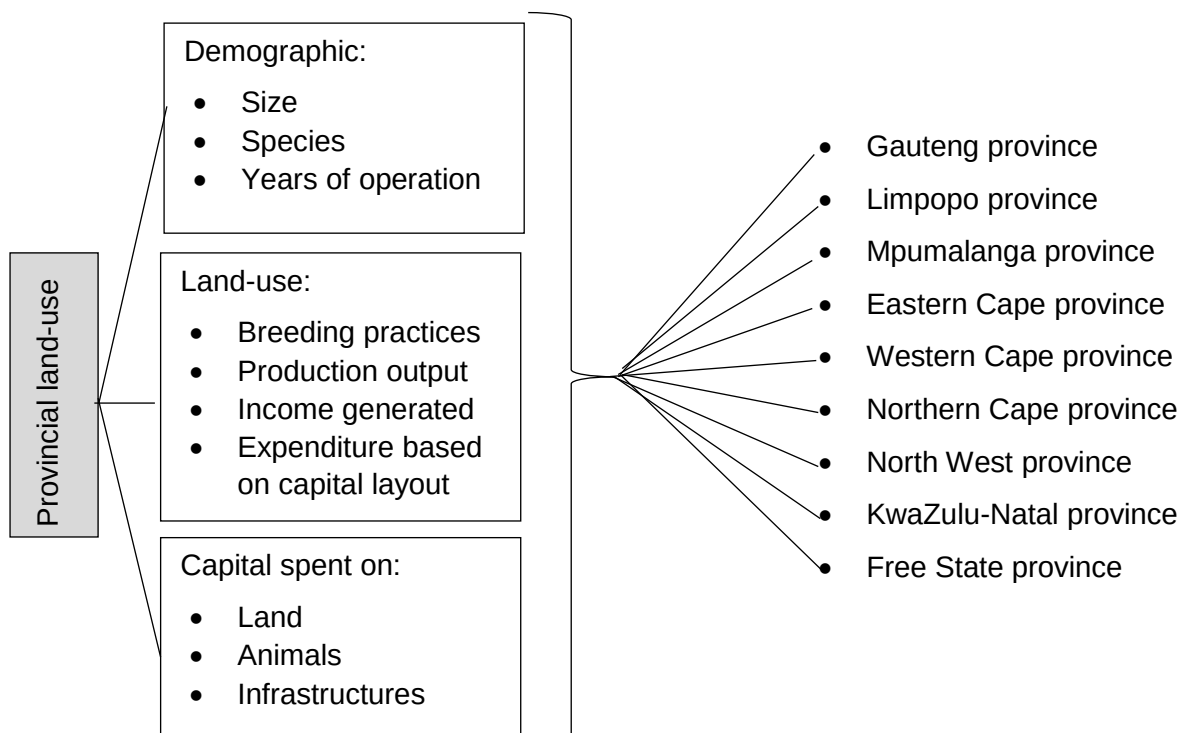


Figure 5.27: Layout of provincial land-use

Figures only indicate information provided by interviewees. Thus, in some provincial figures, there are data ranges that are omitted. Examples are Figure 5.89 that indicate that 67% of respondents spend more than R30 million on capital and 33% between R5 and 10 Million. This does not mean that there are not private wildlife establishments that invest different amounts on capital. The Figures give an indication of the amount of capital that can be invested in KwaZulu-Natal.

5.5.1 Gauteng province

The information below pertains to data collected from the six private wildlife establishments located in the Gauteng province. This information relates to the demographic data (size of

private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spent (on land, animals and infrastructures).

5.5.1.1 Demographic information of private wildlife establishments in the Gauteng province

- **Size of wildlife establishments**

Question 4 of the research instrument aimed to determine the land size of the wildlife establishment owners interviewed in the Gauteng province. The information for the Gauteng province is presented in Figure 5.28.

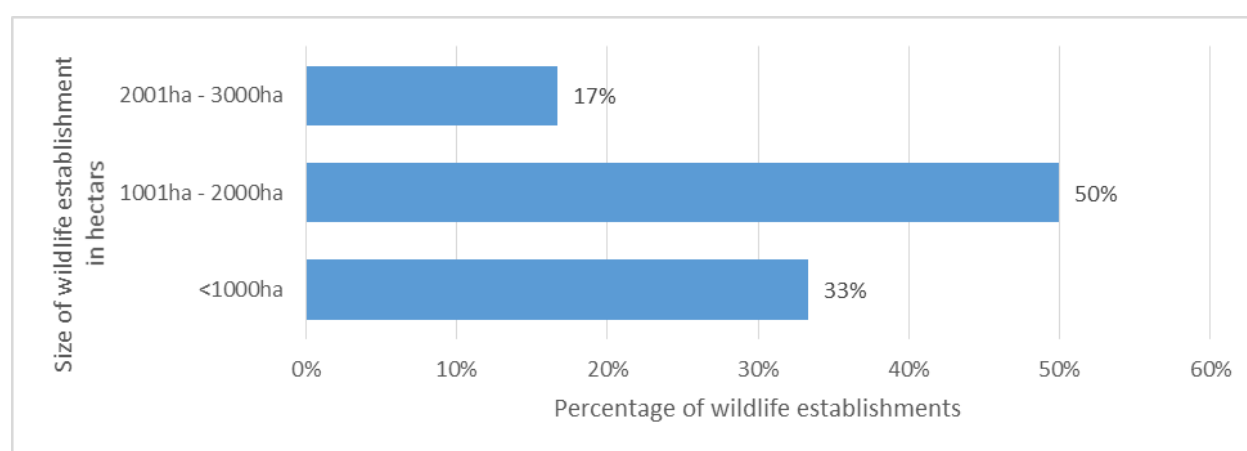


Figure 5.28: Size of wildlife establishments in the Gauteng province

Six interviewees gave responses to this question. The average size of the private wildlife establishments in the Gauteng province is 1 830ha. Three interviewees (50%) indicated that private wildlife establishments are between 1 001 and 3 000ha. This is followed by two interviewees (33%) whose private wildlife establishments are less than 1 000ha and one interviewee (17%) whose private wildlife establishment is between 2 001 and 3 000ha.

- **Species information**

Questions 5 and 6 of the research instrument aimed to analyse the species owned on the private wildlife establishments interviewed from the Gauteng province. Table 5.9 presents the species owned in the Gauteng province.

Table 5.9: Species on Gauteng province's private wildlife establishments

	Bontebok	Bush pig	Duiker (red)	Roan	Steenbok	Blue wildebeest	Klipspringer	Leopard	Buffalo	Bushbuck	Eland	Waterbuck	Black wildebeest
Number of respondents	1	1	1	1	1	2	2	2	3	3	3	3	4
Percentage of respondents	17%	17%	17%	17%	17%	33%	33%	33%	50%	50%	50%	50%	67%
	Gemsbok	Giraffe	Ostrich	Mountain reedbuck	Sable	Kudu	Nyala	Red hartebeest	Blesbok	Duiker (common)	Impala	Springbok	Zebra (Burchell's)
Number of respondents	4	4	4	4	4	5	5	5	6	6	6	6	6
Percentage of respondents	67%	67%	67%	67%	67%	83%	83%	83%	100%	100%	100%	100%	100%

Blesbok, common duiker, impala, springbok and Burchell's zebra are owned by all six interviewees (100%). This is followed by five interviewees (83%) that own kudu, nyala and red hartebeest. black wildebeest, gemsbok, giraffe, ostrich, mountain reedbuck and sable are owned by four interviewees (67%). The other species are owned by 50% or less of the respondents.

- Years operational**

Question 7 of the research instrument aimed to determine the years of operation of the private wildlife establishment owners interviewed in the Gauteng province. Six interviewees gave responses to this question. Figure 5.32 summarises the information.

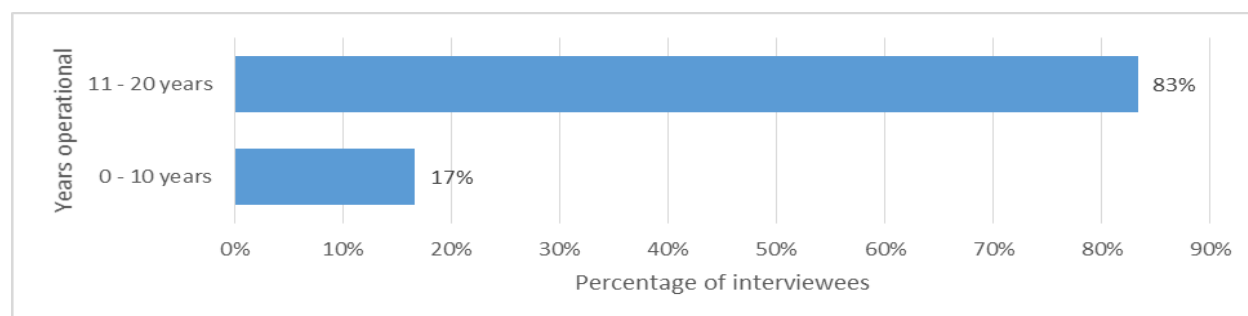


Figure 5.29: Years of operation in the Gauteng province

On average, the private wildlife establishments in the Gauteng province have been operating for 13 years. The largest percentage of private wildlife establishments (83%) in Gauteng have been operating for between 11 and 20 years. One interviewee (17%) has been operating for less than 10 years and the same interviewee, number 81, land size is also the smallest.

5.5.1.2 Land-use in the Gauteng province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners interviewed in the Gauteng province. Six interviewees gave responses to this question. Table 5.10 summarises this information.

Table 5.10: Breeding practices on the Gauteng province's private wildlife establishments

	Total high value	Total plains game	High value			Plains game		
			Controlled environments	Semi-extensive	Extensive	Controlled environments	Semi-extensive	Extensive
Number of interviewees	6	4	5	2	3	4	1	1
Average percent breeding	69%	31%	52%	10%	8%	27%	3%	1%

- **High value species-breeding**

All six interviewees from the Gauteng province allocate an average of 69% of breeding of high value species. The largest percentage of high value breeding (52%) occurs in controlled environments. This is followed by an average of 10% of breeding that occurs in semi-controlled environments and an average of 8% in extensive environments.

- **Plains game-breeding**

Four interviewees from the Gauteng province allocate an average of 31% of breeding to plains game. The largest percentage of plains game breeding (27%) occurs in controlled environments. This is followed by an average of 3% breeding that occurs in semi-controlled environments and an average of 1% in extensive environments.

High value breeding is more popular and both high value and plains game are bred with more in controlled environments within the Gauteng province.

- **Land-use and production output**

Question 10 of the research instrument determines the average production output of the private wildlife establishment owners interviewed in the Gauteng province. Six interviewees gave responses to this question. Figure 5.30 summarises this information.

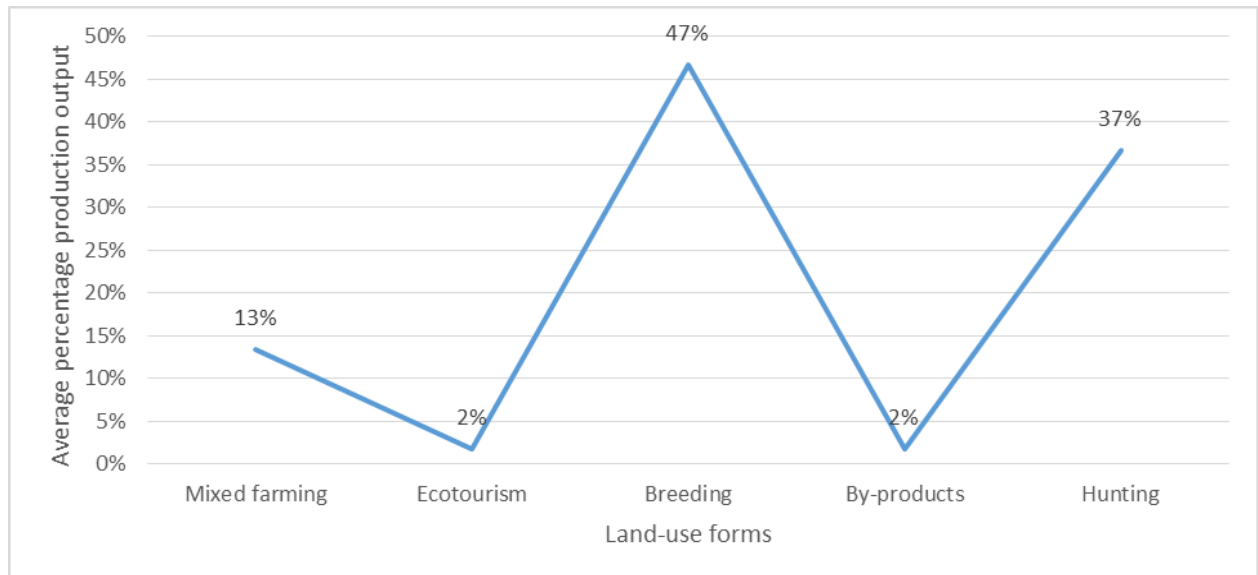


Figure 5.30: Average production output in the Gauteng province

The interviewees from the Gauteng province receive the largest average percentage of their production output from breeding (47%) and hunting (37%). This is followed by an average of 13% of production output from mixed farming. The average percentage of production output received from ecotourism and by-products is (2%).

- **Capital income generated from land-use forms**

Question 12 of the research instrument determines the average income generated on the private wildlife establishments interviewed in the Gauteng province. Six interviewees gave responses to this question. Figure 5.31 summarises this information.

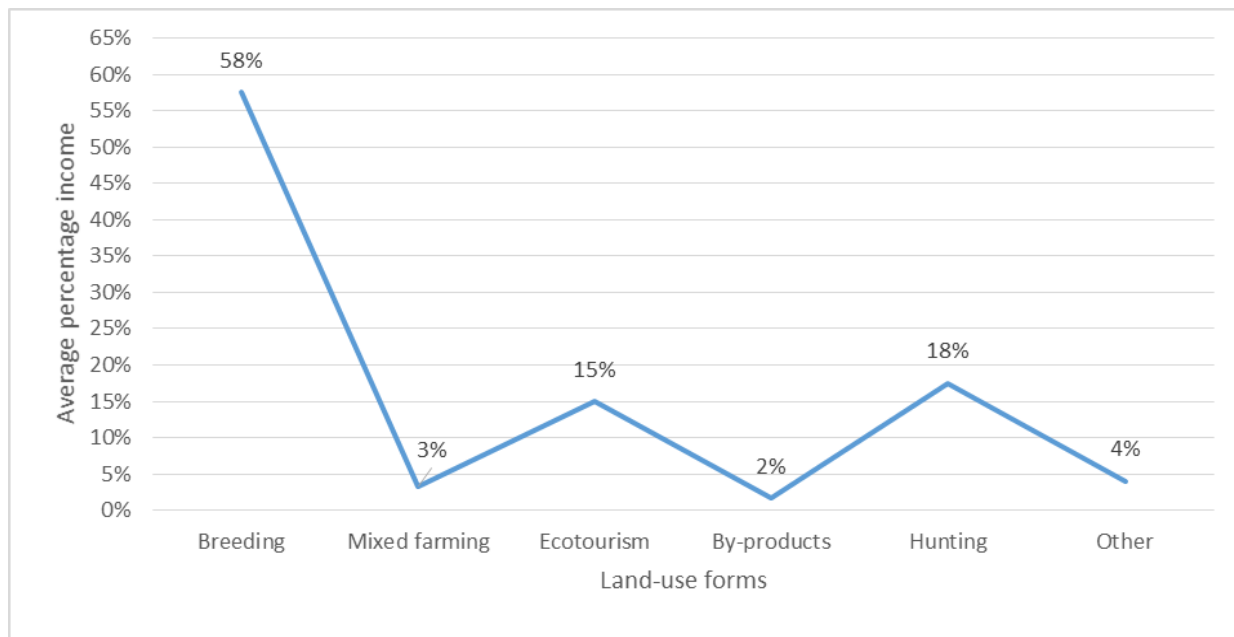


Figure 5.31: Average income generated in the Gauteng province

The largest average percentage of income generated by the Gauteng province landowners (58%) stems from breeding. To a lesser extent, an income is generated from hunting (18%), ecotourism (15%), other land-use forms (4%) and mixed farming (3%). Interviewee 68, who indicated that income is generated from other sources, did not indicate what 'other' land-use forms entail.

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determines the average expenditure based on capital layout of the private wildlife establishment owners interviewed in the Gauteng province. Six interviewees gave responses to this question. Figure 5.32 summarises this information.



Figure 5.32: Average expenditure based on capital layout in the Gauteng province

The largest average percentage of expenditure based on capital layout (60%) stems from breeding. To a lesser extent, average expenditure based on capital layout stems from hunting (17%), mixed farming (15%), ecotourism (7%) and other land-uses (1%). Interviewees for this question in the research instrument did not indicate what 'other' land-use forms entail.

5.5.1.3 Capital spent (land, animals and infrastructure) in the Gauteng province

Question 14 of the research instrument determined capital spent on land, animals and infrastructure of private wildlife establishment owners interviewed in the Gauteng province. Figure 5.33, 5.34 and 5.35 summarises this information.

- ***Capital spent on land***

The information in Figure 5.33 summarises the capital spent on land in the Gauteng province. Five interviewees gave responses to this question.

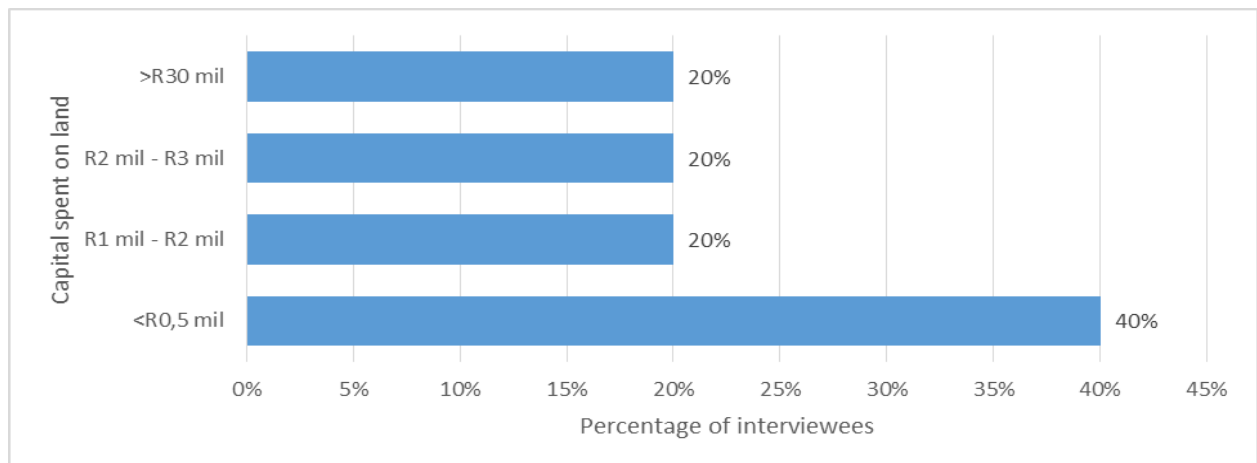


Figure 5.33: Capital spent on land in the Gauteng province

Interviewee 58 (20%) indicated that the capital spent on land is between R1 million and R2 million whilst interviewee 70 spent between R2 million and R3 million. Interviewee 81 spent capital greater than R30 million. Interviewees 68 and 71 (40%) indicated that the capital spent on land was less than R500 000.

- ***Capital spent on animals***

The information in Figure 5.34 summarises the capital spent on animals in the Gauteng province. Five interviewees gave responses to this question.

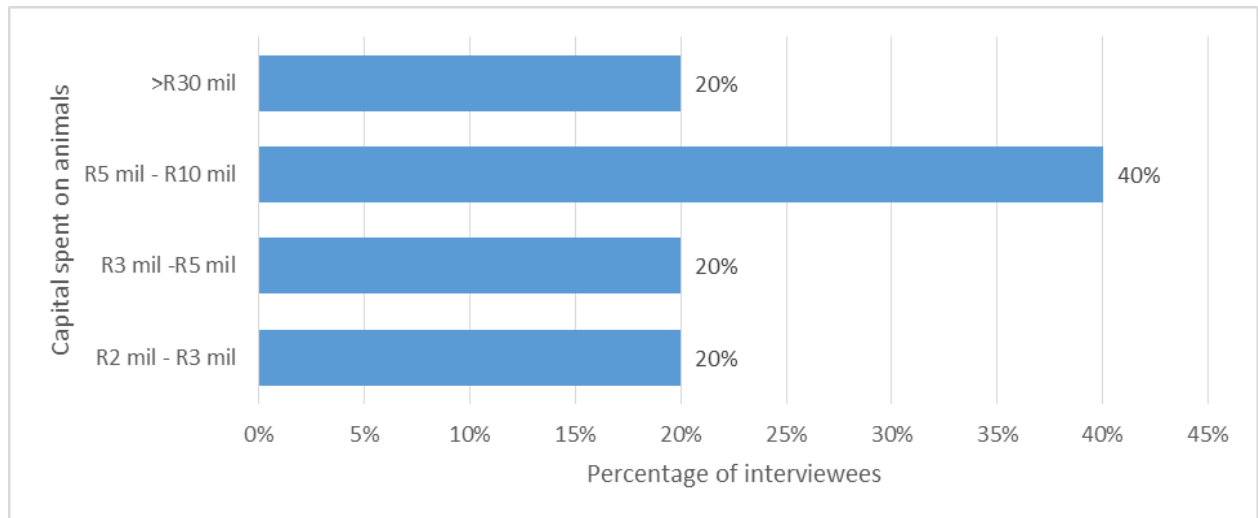


Figure 5.34: Capital spent on animals in the Gauteng province

Interviewee 58 (20%) indicated that the capital spent on animals is between R2 million and R3 million. Interviewee 68 (20%) spent between R3 million and R5 million whilst interviewee 81 (80%) spent capital greater than R30 million. Two interviewees, numbered 70 and 71 (40%), indicated that the capital spent on animals ranged from R5 million to R10 million.

- ***Capital spent on infrastructure***

The information in Figure 5.35 summarises the capital spent on infrastructure in the Gauteng province. Five interviewees gave responses to this question.

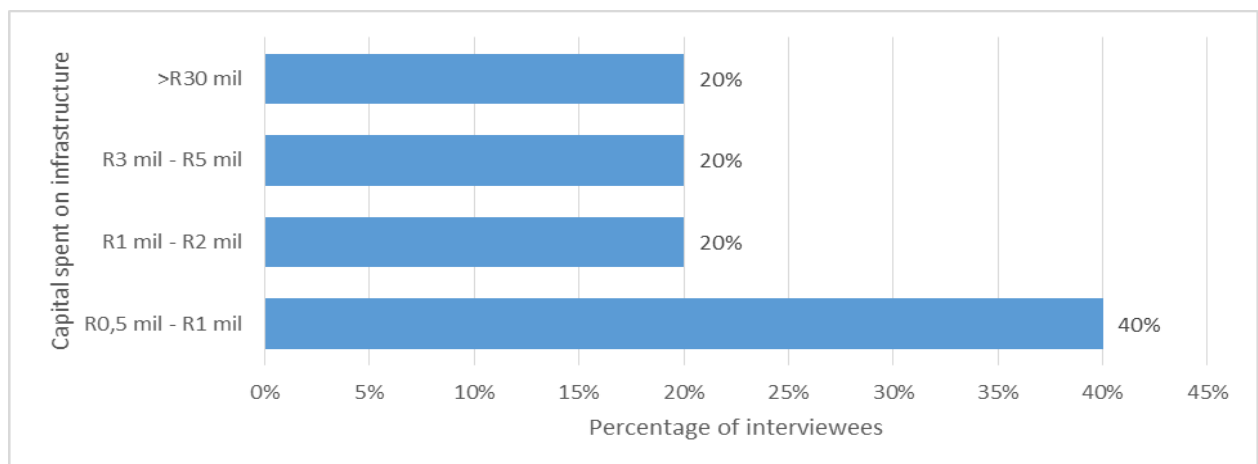


Figure 5.35: Capital spent on infrastructure in the Gauteng province

Interviewee 58 (20%) indicated that the capital spent on infrastructure is between R1 million and R2 million. Interviewee 70 (20%) spent between R3 million and R5 million whilst interviewee 81 (20%) spent an amount larger than R30 million of capital on infrastructure. Interviewees 68 and 71 (40%) indicated that the capital spent on infrastructure range from R500 000 to R1 million.

5.5.2 Limpopo province

The information below pertains to data collected from 115 interviewees that own private wildlife establishments that are located in the Limpopo province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.2.1 Demographic information of private wildlife establishments in the Limpopo province

- **Size of wildlife establishments**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishment owners interviewed in the Limpopo province. In total 115 interviewees gave responses to this question. Figure 5.36 summarises this information.

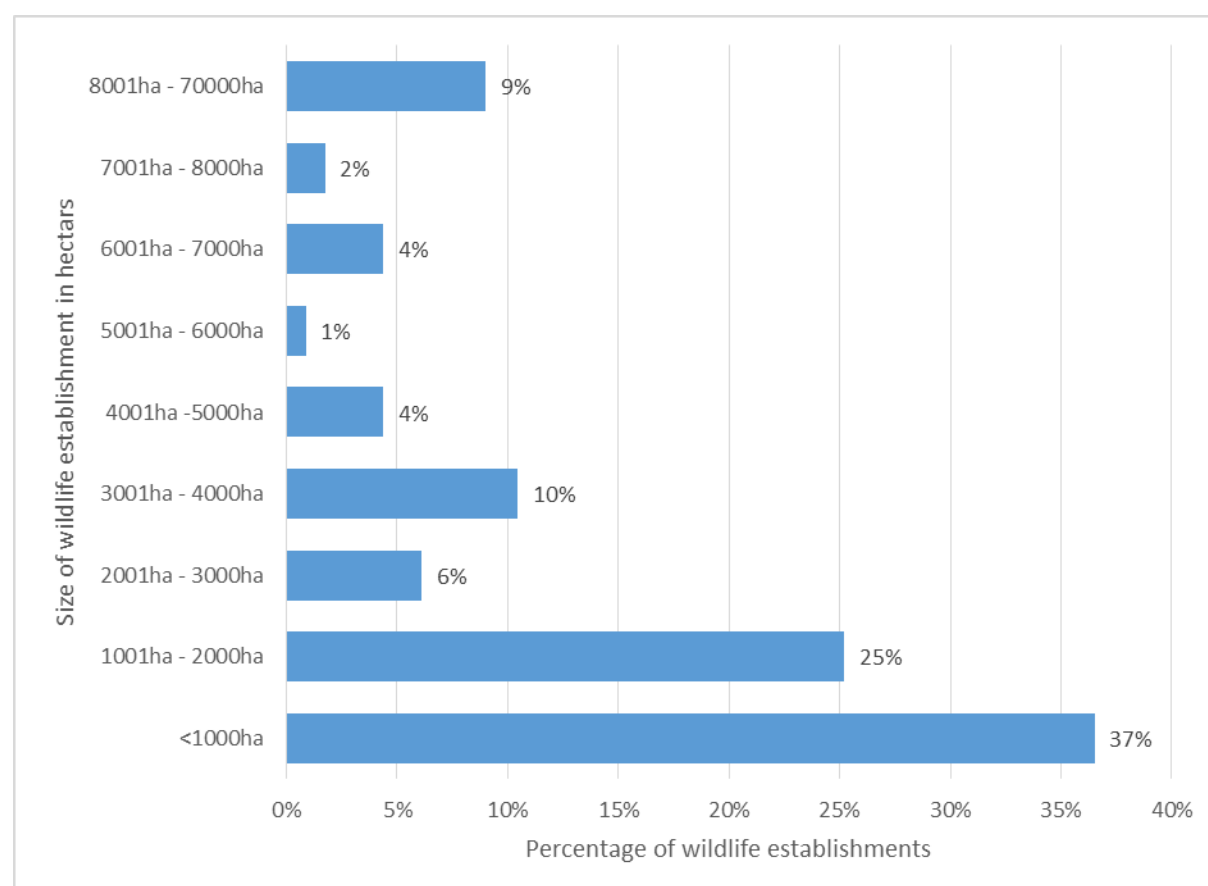


Figure 5.36: Size of wildlife establishments in the Limpopo province

The average size of all private wildlife establishments in the Limpopo province are 3 863ha. This is clearly larger than the land size in Gauteng province. The largest percentage of interviewees (37%) indicated that private wildlife establishments are less than 1 000ha. This is followed by 25% of interviewees' private wildlife establishments being between 1 001 and

2 000ha. Of the remaining interviewees, 10% of interviewees private wildlife establishments are between 3 001 and 4 000ha and between 8 001ha and 70 000ha respectively. The rest are all less than 10%.

- **Species information**

Questions 5 and 6 of the research instrument aimed to determine species owned on the private wildlife establishments interviewed from the Limpopo province. Table 5.11 indicates the species owned.

Table 5.11: Species on the Limpopo province's private wildlife establishments

	Lechwe	Oribi	Rhino (black)	Elephant	Sharpe's grysbok	Lion	Rhino (white)	Suni	Zebra (mountain)	Bontebok	Duiker (red)	Duiker (blue)	Black wildebeest	Hippopotamus
Number of respondents	3	4	4	5	5	6	6	6	6	7	7	11	13	13
Percentage of respondents	3%	3%	3%	4%	4%	5%	5%	5%	5%	6%	6%	10%	11%	11%
	Grey rhebok	Reedbuck mountain	Crocodile	Reedbuck	Tsessebe	Ostrich	Roan	Klipspringer	Leopard	Springbok	Red hartebeest	Sable	Buffalo	Giraffe
Number of respondents	16	19	22	22	24	37	37	40	41	42	47	48	49	56
Percentage of respondents	14%	17%	19%	19%	21%	32%	32%	35%	36%	37%	41%	42%	43%	49%
	Aardvark	Blesbok	Bush pig	Zebra (Burchell's)	Bushbuck	Eland	Steenbok	Gemsbok	Waterbuck	Blue wildebeest	Duiker (common)	Nyala	Kudu	Impala
Number of respondents	58	61	63	64	65	66	70	71	72	84	84	90	98	101
Percentage of respondents	50%	53%	55%	56%	57%	57%	61%	62%	63%	73%	73%	78%	85%	88%

In total, 110 interviewees (88%) own impala. This is followed by 98 interviewees (85%) that own kudu, 90 interviewees (78%) that own nyala, 84 interviewees (73%) own blue

wildebeest and common duiker, 72 interviewees (63%) own waterbuck, 71 interviewees (62%) own gemsbok, 70 interviewees (61%) own steenbok and 66 interviewees (57%) own eland. Lastly, 65 interviewees (57%) own bushbuck, 64 interviewees (56%) own Burchell's zebra, 63 interviewees (55%) own bush pig, 61 interviewees (53%) own blesbok and 58 respondents (50%) own aardvark. The remaining species are owned by less than 50% of the Limpopo province interviewees.

- **Years operational**

Question 7 of the research instrument aimed to determine the years of operation of the private wildlife establishments interviewed from the Limpopo province. In total, 112 interviewees gave responses to this question. Figure 5.40 summarises this.

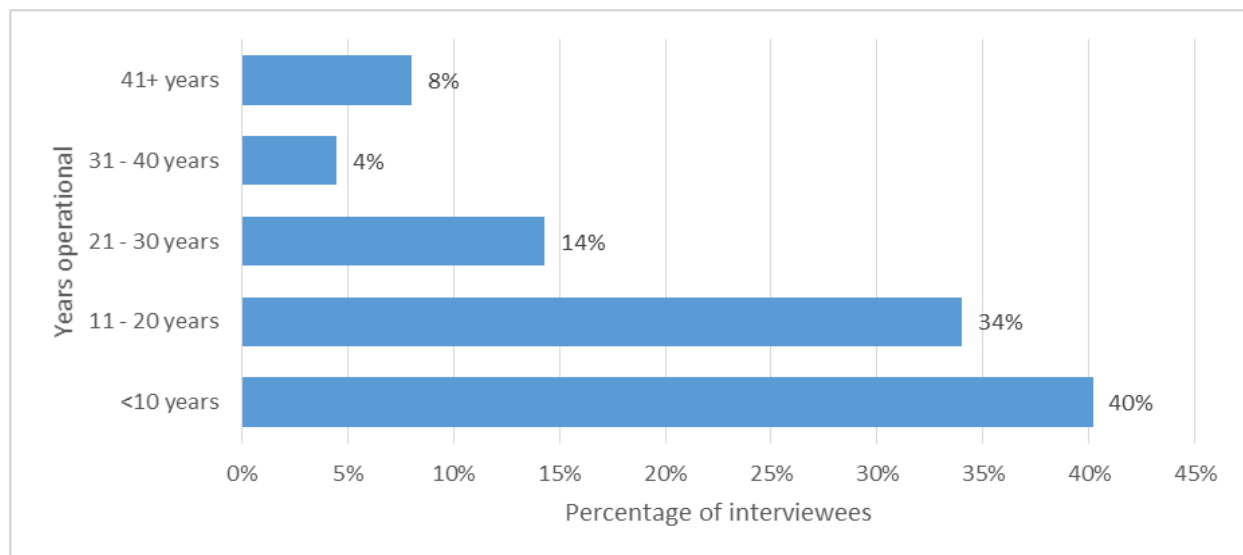


Figure 5.37: Years of operation in the Limpopo province

On average, the private wildlife establishment owners interviewed in the Limpopo province have been in operation for 18 years. The largest percentage of private wildlife establishments have been in existence for less than 20 years. In total, 40% of interviewees have been operational for less than 10 years and 34% between 11 and 20 years. Of the remaining interviewees, 14% have been operational for between 21 and 30 years, 4% between 31 and 40 years and 8% for more than 41 years. Thus the largest percentage of private wildlife establishments are new to the industry. These interviewee's numbers are 3, 8, 11, 19, 24, 28, 29, 35, 37, 42, 63, 65, 84, 89, 91, 92, 96, 100, 101, 113, 119, 125, 137, 148, 166, 167, 169, 170, 174, 181, 192, 193, 199, 202, 205, 209 and 219.

5.5.2.2 Land-use in the Limpopo province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners interviewed from the Limpopo province. In total 114 interviewees gave responses to this question. Table 5.12 summarises this information.

Table 5.12: Breeding practices on the Limpopo province's private wildlife establishments

	Total high value	Total plains game	High value			Plains game		
			Controlled environments	Semi-extensive	Extensive	Controlled environments	Semi-extensive	Extensive
Number of interviewees	94	93	75	14	27	30	16	50
Average percent of breeding	47%	49%	29%	5%	10%	16%	9%	23%

- ***High value species-breeding***

In total, 94 interviewees from the Limpopo province allocate an average of 47% to breeding of high value game. The largest percentage of high value species breeding (29%) occurs in a controlled environment. This is followed by an average of 5% breeding that occurs in semi-controlled environments and average of 10% in extensive environments.

- ***Plains game-breeding***

In total, 93 interviewees from the Limpopo province allocate an average of 49% to breeding of plains game. The largest percentage of plains game breeding (23%) occurs in an extensive environment. This is followed by an average of 16% of breeding that occurs in a controlled environment and 9% in a semi-extensive environment.

Overall, the difference on whether high value or plains game is bred is within a small margin.

- **Land-use and production output**

Question 10 of the research instrument determines the average production output generated from the private wildlife establishments interviewed from the Limpopo province. In total 110 interviewees gave responses to this question. Figure 5.38 summarises this information.

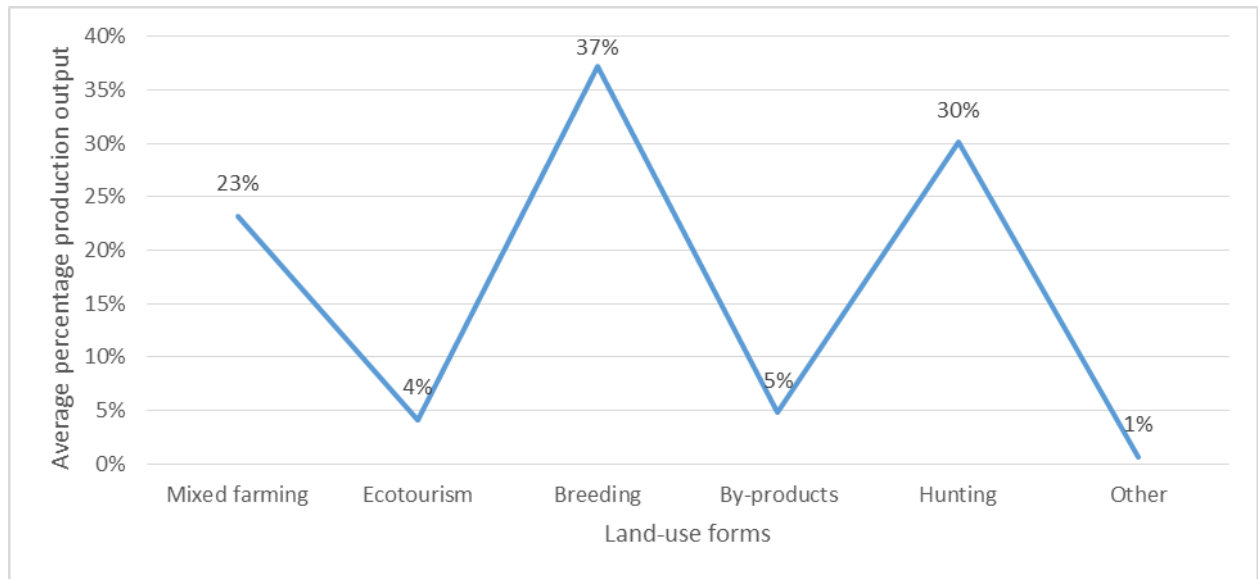


Figure 5.38: Average production output in the Limpopo province

The largest percentages of average production output are received from breeding (37%), hunting (30%) and mixed farming (23%). The average production outputs from ecotourism (4%), by-products (5%) and other land-use activities (1%) are very low. Interviewees 59, 133, 159 and 223 indicated other land-uses for this question in the research instrument but did not indicate what 'other' land-use forms entail.

- **Capital income generated from land-use forms**

Question 12 of the research instrument determines the average income generated from different land-uses on the private wildlife establishments interviewed from the Limpopo province. In total, 108 interviewees gave responses to this question. Figure 5.39 summarises this information.

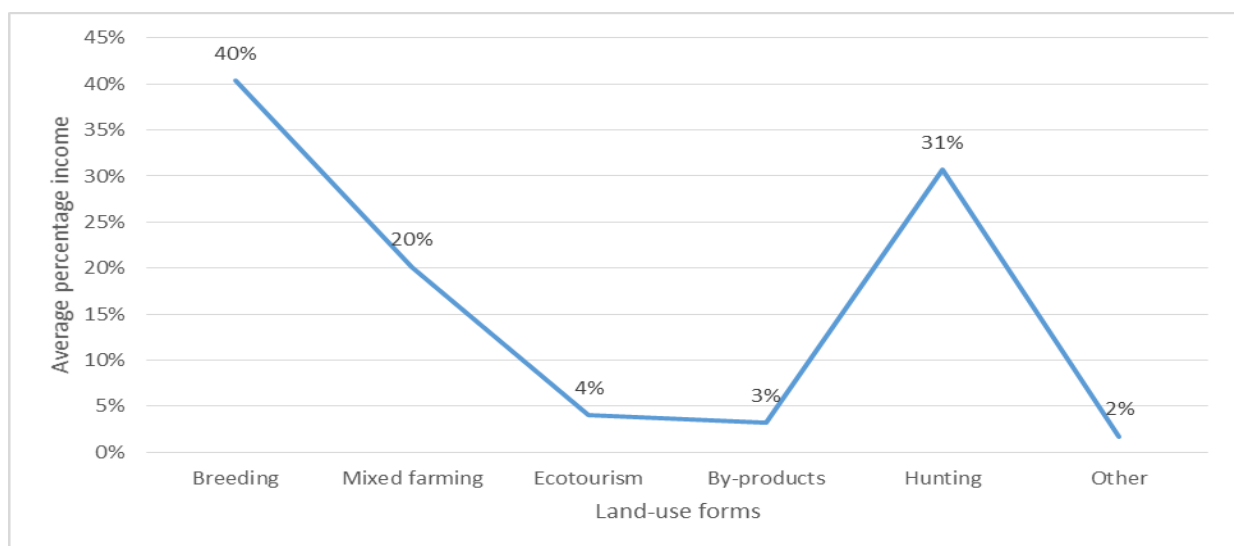


Figure 5.39: Average income generated in the Limpopo province

The largest percentages of average income generated stem from breeding (40%), hunting (31%) and mixed farming (20%). The average incomes generated from ecotourism (4%), by-products (3%) and other land-use forms (2%) are low. Three interviewees (124, 144 and 170) indicated other land-uses for this question in the research instrument, however they did not indicate what 'other' land-use forms entail.

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determined the average expenditure based on capital layout of the private wildlife establishments interviewed from the Limpopo province. In total, 107 interviewees gave responses to this question. Figure 5.40 summarises this information.

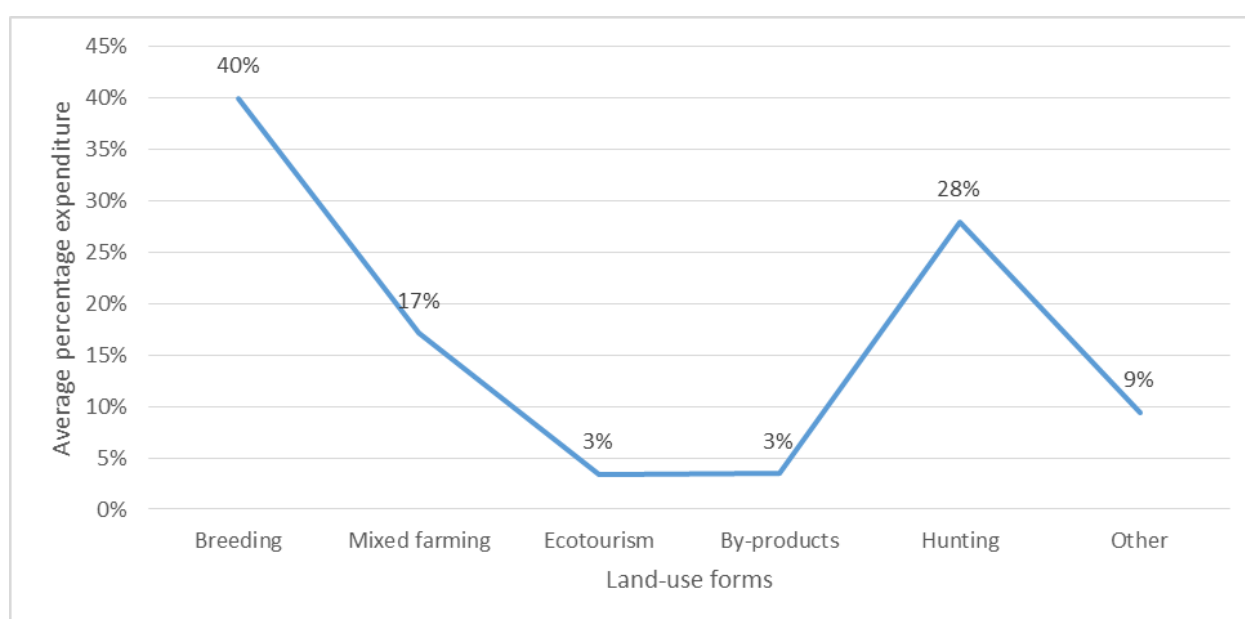


Figure 5.40: Average expenditure based on capital layout in the Limpopo province

The largest percentages of average expenditure based on capital layout stem from breeding (40%) and hunting (28%). This is followed by 17% of expenditure based on capital layout coming from mixed farming. The expenditures based on capital layout from ecotourism (3%), by-products (3%) and other land-use forms (9%) are low. Interviewees 22, 33, 38, 53, 61, 77, 8, 108, 116, 117, 124, 133, 134, 138, 149, 166, 169, 170, 176, 177, 193, 209 and 211 indicated that land-use forms that account for expenditure based on capital layout include 'other' land-use forms include accommodation, maintenance, fences, auctions, feed and wages.

5.5.2.3 Capital spent on land, animals and infrastructure in the Limpopo province

Question 14 determined the capital spent on land, animals and infrastructure by private wildlife establishments interviewed from the Limpopo province. Figure 5.41, 5.42 and 5.43 summarises this information.

- **Capital spent on land**

The information in Figure 5.41 summarises the capital spent on land in the Limpopo province. In total, 102 interviewees gave responses to this question.

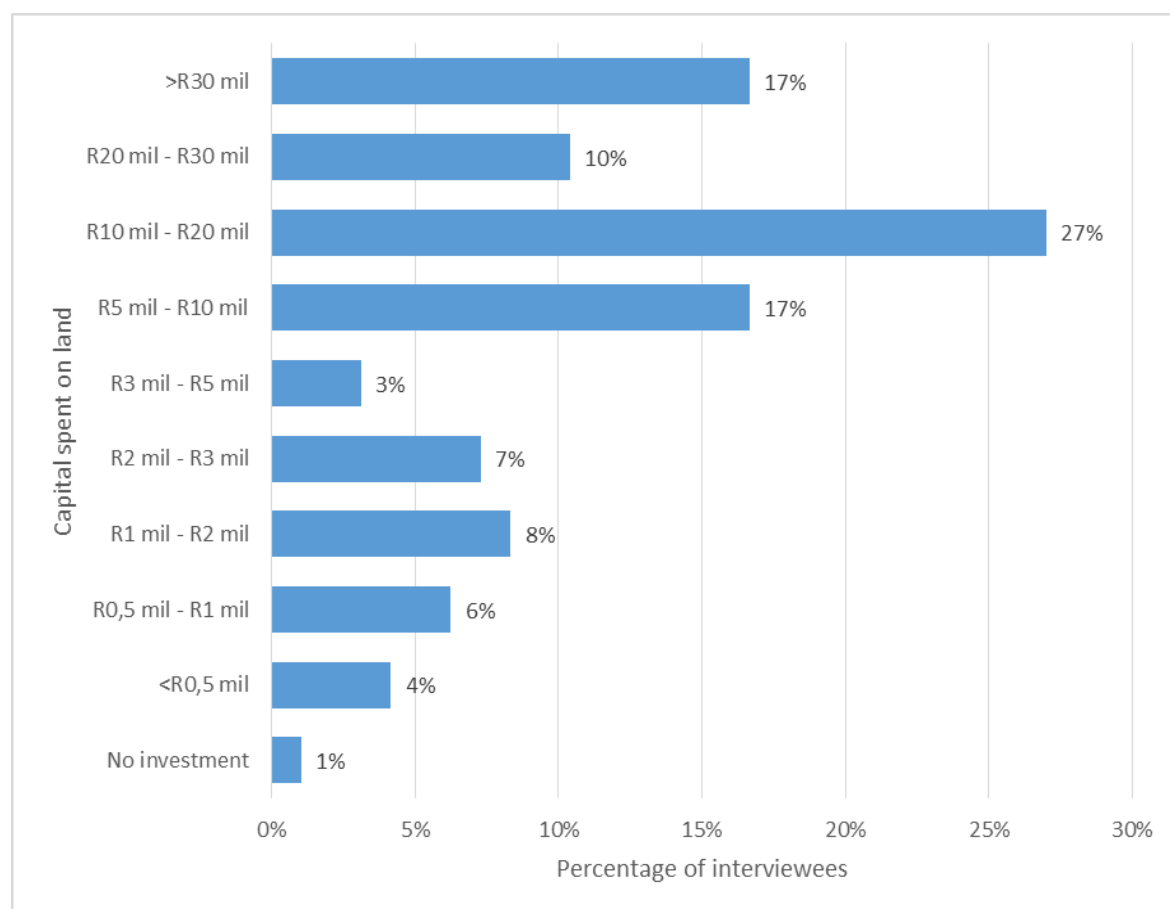


Figure 5.41: Capital spent on land in the Limpopo province

The largest percentage of interviewees (27%) spent between R10 million and R20 million on land. This is followed by 17% of interviewees that spent between R5 million and R10 million and 17% that spent more than R30 million on land. The rest all spent 10% or less. The interviewee numbers that spent between R10 million and R20 million are 4, 19, 27, 29, 34, 35, 37, 57, 72, 77, 100, 101, 116, 117, 119, 128, 133, 134, 136, 138, 160, 167, 181, 189 and 209.

- **Capital spent on animals**

The information in Figure 5.42 summarises the capital spent on animals in the Limpopo province. In total, 106 interviewees gave responses to this question.

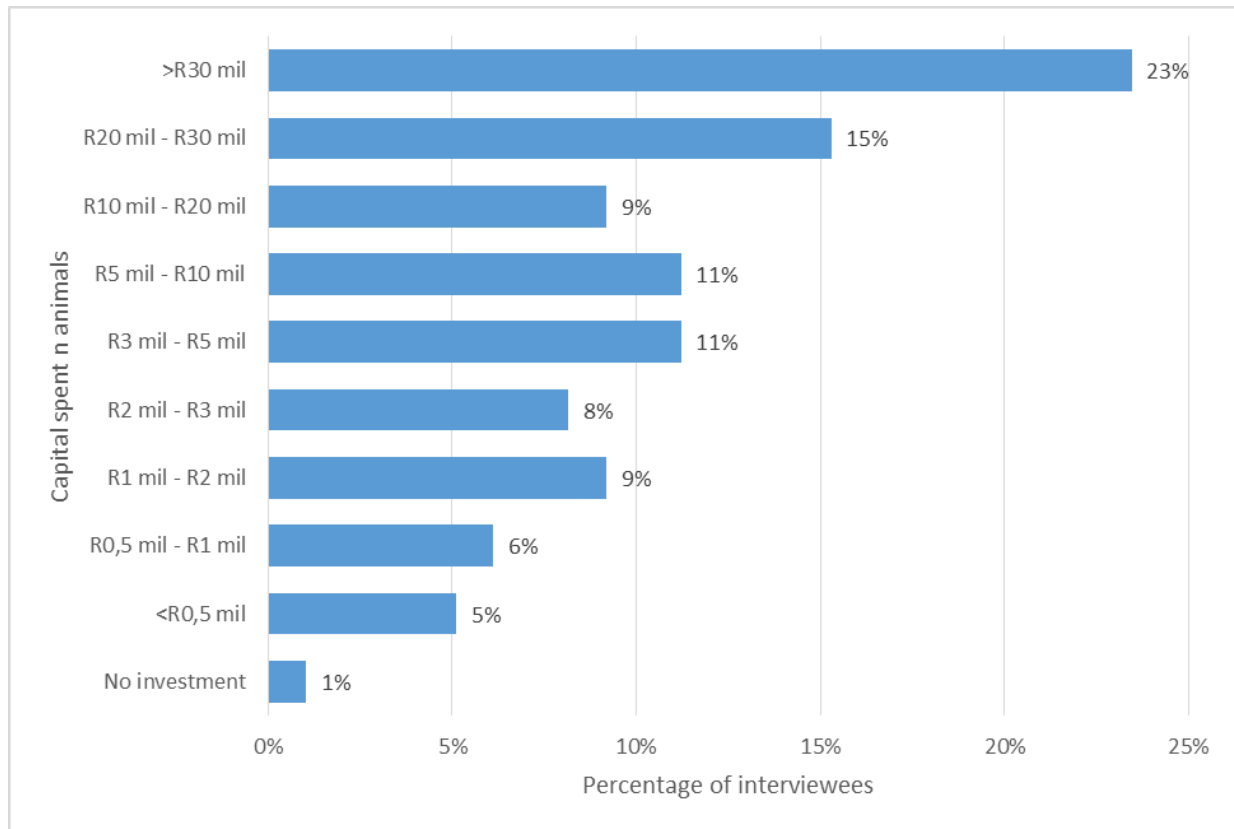


Figure 5.42: Capital spent on animals in the Limpopo province

The largest percentage of interviewees (23%) spent more than R30 million on animals and 15% of interviewees spent between R20 and R30 million on animals. This is followed by 11% of interviewees that spent between R3 million and R5 million and 11% that spent between R5 million and R10 million. The rest were all 10% and lower. The interviewees that spent capital worth more than R30 million are 7, 21, 30, 31, 33, 34, 35, 38, 47, 78, 111, 113, 118, 119, 121, 127, 144, 148, 149, 151, 159, 165 and 176.

- **Capital spent on infrastructure**

The information in Figure 5.43 summarises the capital spent on infrastructure in the Limpopo province. In total, 105 interviewees gave responses to this question.

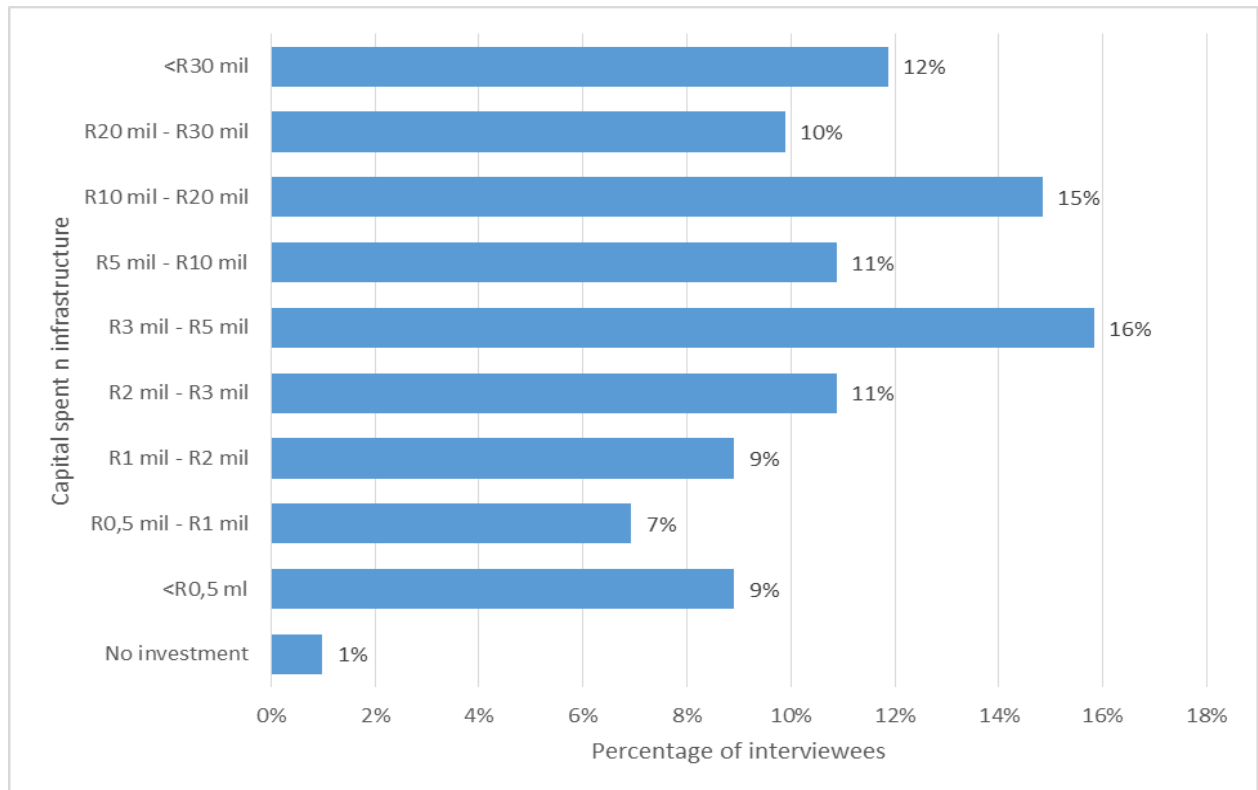


Figure 5.43: Capital spent on infrastructure in the Limpopo province

The largest percentage of interviewees (16%) spent between R3 million and R5 million on infrastructure. This is followed by 15% of interviewees between R10 million and R20 million on infrastructure and 11% of interviewees who spent between R5 million and R10 million and 11% that spent between R2 million and R3 million on infrastructure. The rest were all 10% and lower. The interviewees that spent between R3 million and R5 million worth of capital on infrastructure are 21, 29, 46, 51, 105, 111, 117, 136, 138, 148, 151, 159, 167, 181 and 205.

5.5.3 Mpumalanga province

The information below pertains to data collected from eight interviewees that own private wildlife establishment located in the Mpumalanga province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.3.1 Demographic information of private wildlife establishments in the Mpumalanga province

- **Size of wildlife establishments**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishment owners interviewed from the Mpumalanga province. Seven interviewees gave responses to this question. Figure 5.44 summarises this information.

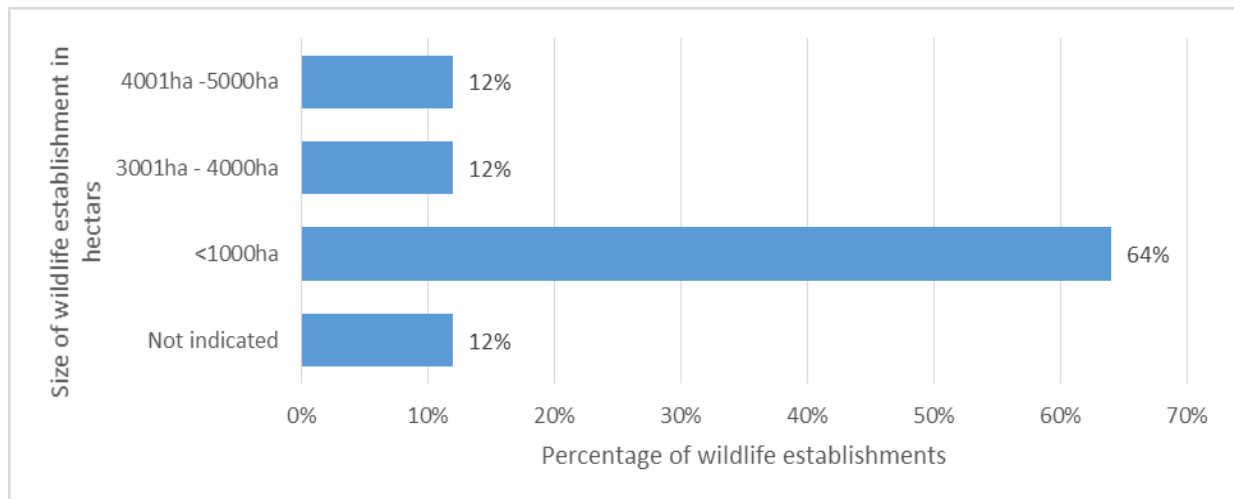


Figure 5.44: Size of wildlife establishments in the Mpumalanga province

The average size of all private wildlife establishments in the Mpumalanga province is 1 457ha. The largest percentage of private wildlife establishments (64%) are smaller than 1 000ha. The remaining two interviewees' (numbers 161 and 185) land sizes are either between 3 001 and 4 000ha and 4 001 and 5 000ha. Interviewee 171 did not indicate the size of the establishment.

- **Species information**

Question 5 and 6 of the research instrument aimed to determine species owned on the private wildlife establishment owners interviewed from the Mpumalanga province. Table 5.13 summarises this information.

Table 5.13: Species on Mpumalanga province's private wildlife establishments

	Aardvark	Elephant	Grey rhebuck	Klipspringer	Nyala	Roan	Blue wildebeest	Buffalo	Bush pig	Eland	Giraffe	Impala	Leopard	Oribi
Number of respondents	1	1	1	1	1	1	2	2	2	2	2	2	2	2
Percentage of respondents	13%	13%	13%	13%	13%	13%	25%	25%	25%	25%	25%	25%	25%	25%
	Red hartebeest	Tsessebe	Waterbuck	Reedbuck mountain	Steenbok	Blesbok	Kudu	Bushbuck	Gemsbok	Springbok	Zebra (Burchells)	Ostrich	Duiker (common)	Black wildebeest
Number of respondents	2	2	2	3	3	3	3	3	4	4	4	4	5	6
Percentage of respondents	25%	25%	25%	38%	38%	38%	38%	38%	50%	50%	50%	50%	63%	75%

Six interviewees (75%) own Burchell's zebra, five interviewees (63%) own springbok and 4 interviewees (50%) own blesbok, black wildebeest, common duiker and gemsbok. Three interviewees (38%) own bushbuck, kudu, ostrich, mountain reedbuck and steenbok. The other species are owned by 25% or less of the interviewees of the Mpumalanga province.

- Years operational**

Question 7 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners interviewed from the Mpumalanga province. Eight interviewees gave responses to this question. Figure 5.45 summarises this information.

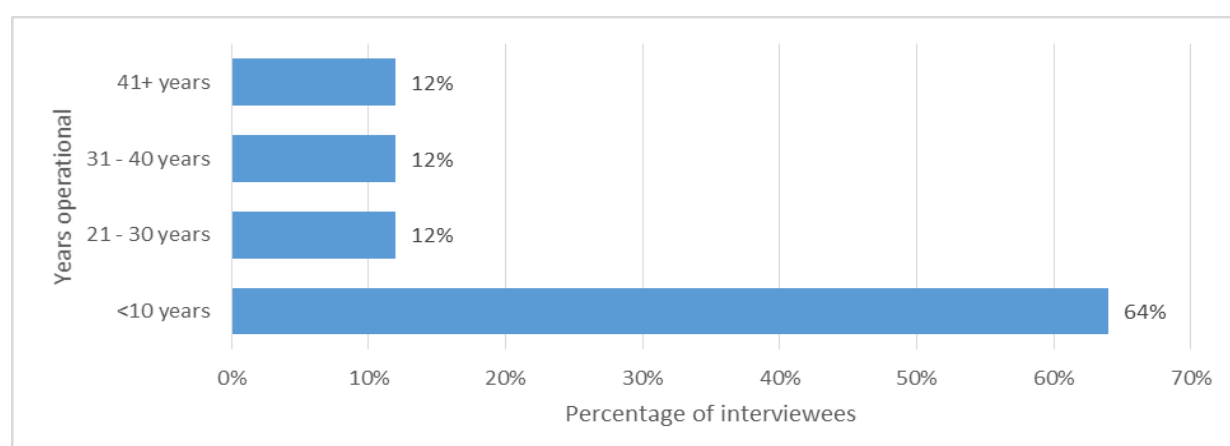


Figure 5.45: Years of operation in the Mpumalanga province

On average, the private wildlife establishment owners interviewed in the Mpumalanga province have been operating for 11 years. The calculation excludes one private wildlife establishment that has been operating for 1 622 years. The largest percentage of interviewees (64%) have been operational for less than 10 years. The remaining three interviewees' private wildlife establishments have been operational for between 21 to 30 years, 31 and 40 years and more than 40 years respectively. The interviewee numbers that indicated that their establishments have been operating less than 10 years are interviewee number 171, 185, 186, 187 and 218.

Thus the largest percentage of private wildlife establishments are new. The information below indicates that mixed farming practices have a high production output, income and expenditure based on capital layout. With such a high percentage of new wildlife establishments, it may be that the aim is to slowly incorporate game farming into land-use and reduce mixed farming practices.

5.5.3.2 Land-use in the Mpumalanga province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners interviewed from the Mpumalanga province. Eight interviewees gave responses to this question. Table 5.14 summarises this information.

Table 5.14: Breeding practices on the Mpumalanga province's private wildlife establishments

	Total High Value	Total Plains Game	High Value			Plains Game		
			Controlled Environments	Semi-extensive	Extensive	Controlled Environments	Semi-extensive	Extensive
Number of interviewees	4	7	1	0	3	0	2	5
Average percent of breeding	25%	75%	13%	0%	13%	0%	19%	56%

- **High value species-breeding**

Four interviewees from Mpumalanga allocate an average of 25% to breeding of high value game. The largest percentage of high value breeding (13%) occur in a controlled and extensive environment. No interviewees from the Mpumalanga province apply breeding practices in a semi-extensive environment.

- **Plains game-breeding**

Seven interviewees from the Mpumalanga province allocate an average of 75% of breeding to plains game. The largest percentage of plains game breeding (56%) occurs in an extensive environment. This is followed by 19% of plains game breeding practice applied in a semi-extensive environment. It is interesting to note that none of the interviewees from the Mpumalanga province apply breeding practices in controlled environments.

The overall focus seems to be plains game breeding in extensive environments.

- **Land-use and production output**

Question 10 of the research instrument determines the average production output of the private wildlife establishments interviewed from the Mpumalanga province. Eight interviewees gave responses to this question. Figure 5.46 summarises this information.

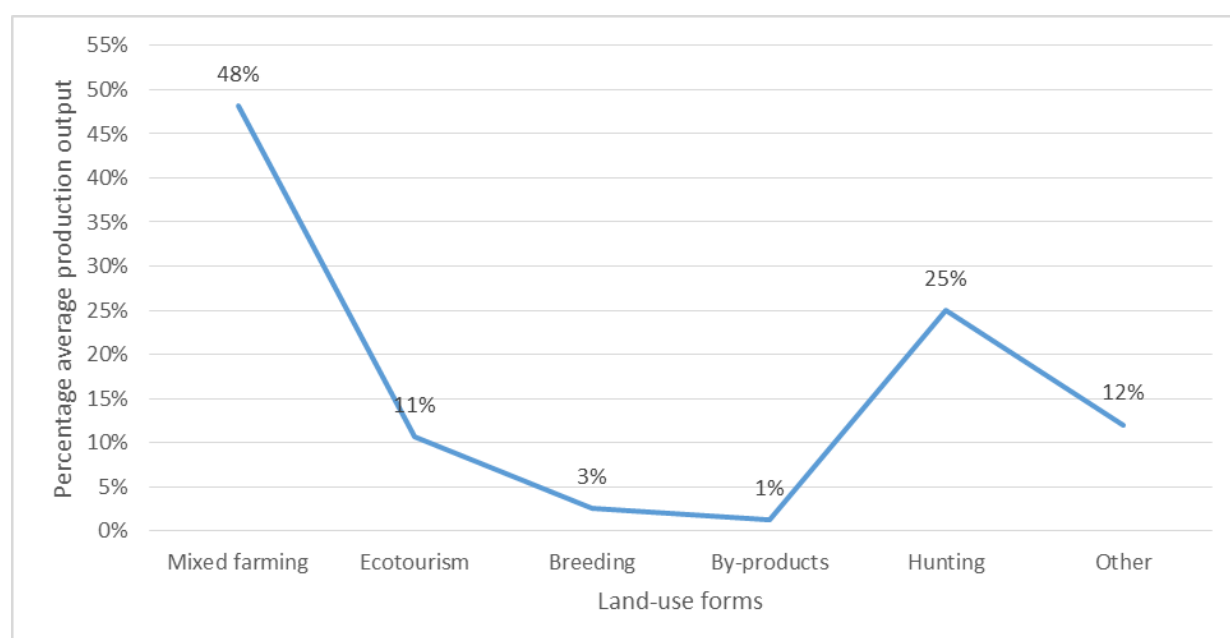


Figure 5.46: Average production output in the Mpumalanga province

On average, the largest percentage of production output stems from mixed farming (48%) which was indicated by interviewees 185 to 188, 190 and 218. The average production output from the other pillars include hunting (23%), ecotourism (11%), breeding (3%) and by-products (1%). Other land-use forms accounted for 12% of production output indicated by one interviewee. Interviewees 161, 186 and 218 who indicated that production output is generated from other land-uses did not specify what 'other' entailed. The production output from mixed farming in the Mpumalanga province is higher than in the other provinces. The incorporation of wildlife is mostly less than 10 years which may indicate that, over time, the production output from land-use forms that relate to wildlife may grow.

- **Capital income generated from land-use forms**

Question 12 of the research instrument summarises the average income generated by the private wildlife establishment owners interviewed from the Mpumalanga province. Eight interviewees gave responses to this question. Figure 5.47 summarises this information.

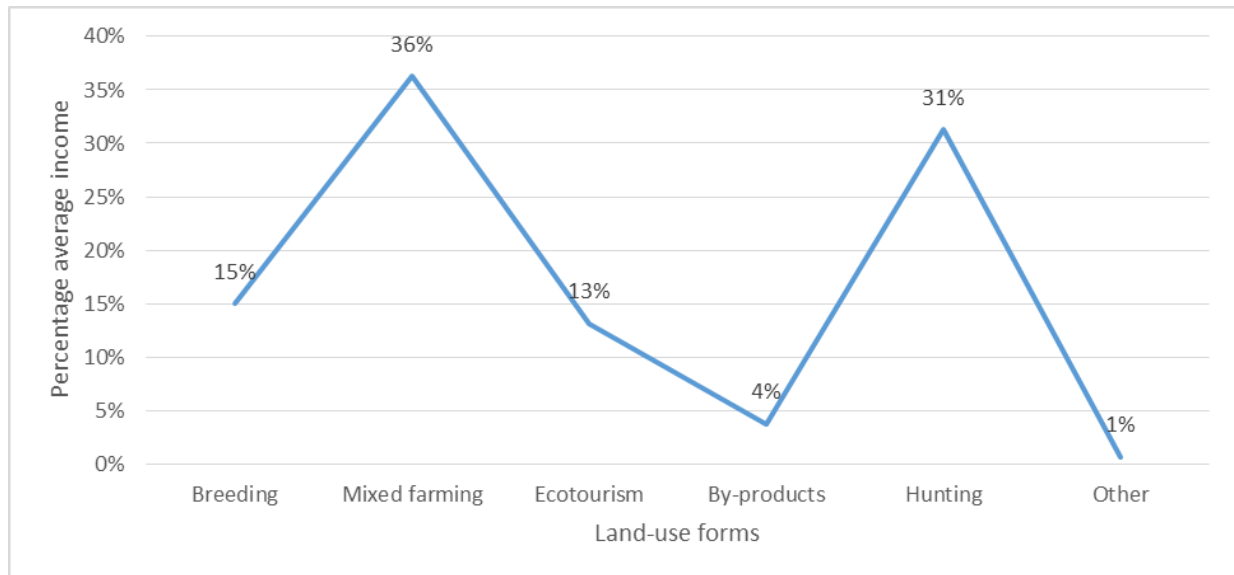


Figure 5.47: Average capital income generated in the Mpumalanga province

The largest percentage of average income is generated from mixed farming (36%) by interviewees 185 to 188. This is followed by hunting (31%). In addition, average income is generated from breeding (15%) whilst 13% of the average income is generated from tourism. By-products (4%) and other land-use forms by one interviewee (1%) generate the least average income. The interviewee did not indicate what other land-use forms entail. The average income from mixed farming is greater than that of the other provinces and it may stem from the high production output that, in turn, stems from mixed farming.

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determines the average expenditure based on capital layout of the private wildlife establishment owners interviewed from the Mpumalanga province. Eight interviewees gave responses to this question. Figure 5.48 summarises this information.

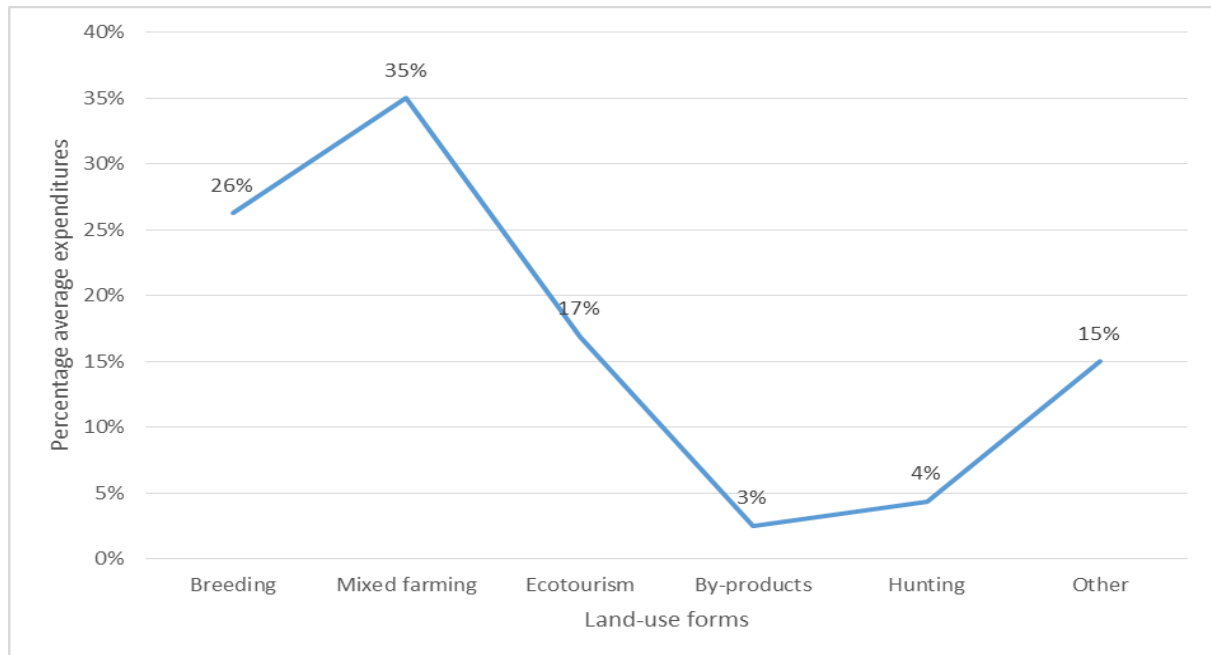


Figure 5.48: Average expenditure based on capital layout in the Mpumalanga province

The largest percentage of average expenditure based on capital layout stems from mixed farming (35%) and breeding (26%). Other average expenditures based on capital layout stem from ecotourism (17%), hunting (4%) and by-products (3%). Other land-use forms that cause an average of 15% of expenditure based on capital layout include paying off land which was indicated by interviewees 161 and 171. The expenditure based on capital layout for both mixed farming and breeding is high. Considering this discussion on production output and expenditure, an assumption could be that the private wildlife establishment owners in the Mpumalanga province are starting to invest in breeding practices as a new form of land-use.

5.5.3.3 Capital spent (land, animals and infrastructure) in the Mpumalanga province

Question 14 of the research instrument determines the capital spent on land, animals and infrastructure by the private wildlife establishment owners interviewed from the Mpumalanga province. Figure 5.49, 5.50 and 5.51 summarises this information.

- ***Capital spent on land***

The information in Figure 5.49 summarises the capital spent on land in the Mpumalanga province. Four interviewees gave responses to this question.

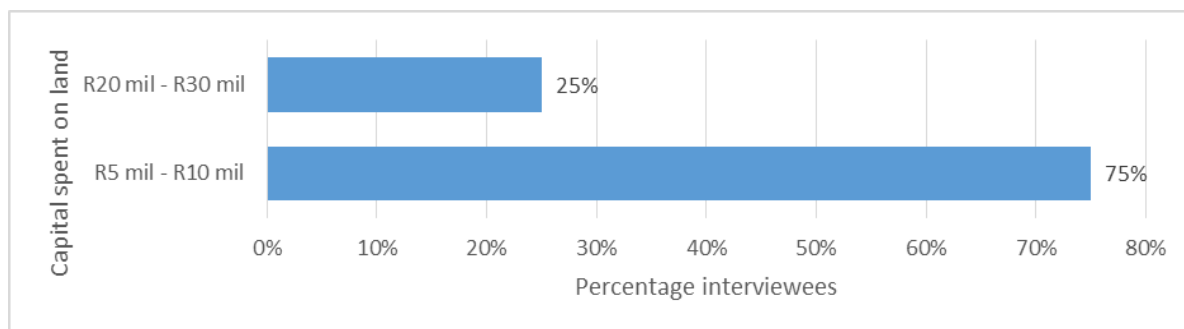


Figure 5.49: Capital spent on land in the Mpumalanga province

The largest percentage of interviewees (75%) have spent between R5 million and R10 million of capital on land whilst 25% have spent between R20 million and R30 million of capital on land. The interviewees that spent capital on land are 171, 186 and 187.

- ***Capital spent on animals***

The information in Figure 5.50 summarises the capital spent on animals in the Mpumalanga province. Seven interviewees gave responses to this question.

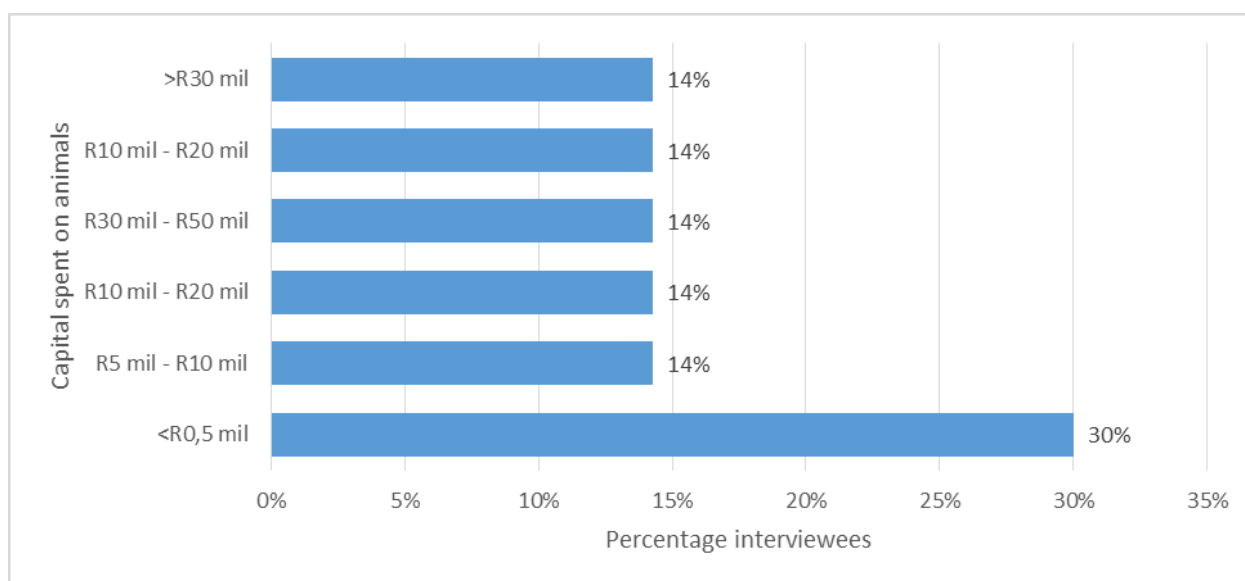


Figure 5.50: Capital spent on animals in the Mpumalanga province

Interviewees 188 and 190 (30%) spent less than R500 000 capital on animals. The remaining interviewees have each spent between R5 million and R10 million, R10 million and R20 million, R3 million to R5 million, R10 million and R20 million and more than R30 millionha on animals, respectively.

- ***Capital spent on infrastructure***

The information in Figure 5.51 summarises the capital spent on infrastructure in the Mpumalanga province. Six interviewees gave responses to this question.

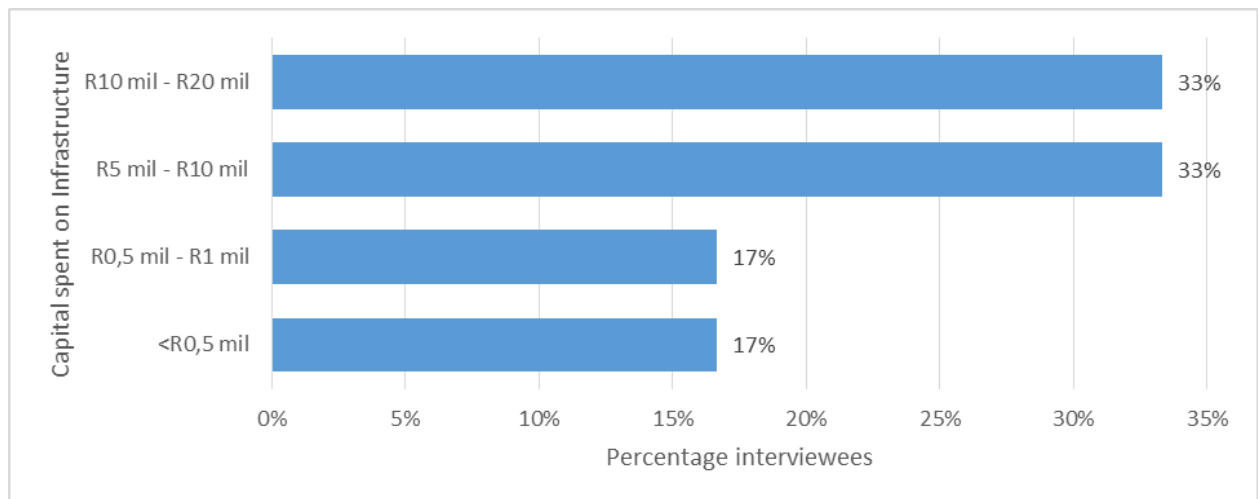


Figure 5.51: Capital spent on infrastructure in the Mpumalanga province

In total, 33% have spent between R5 million and R10 million (interviewees 186 and 190) and the same percentage of interviewees have spent between R10 million and R20 million (interviewees 161 and 171) of capital on infrastructure. Of the remaining interviewees, 17% have spent between R500 000 and R1 million of capital on infrastructure and 17% of interviewees less than R500 000 of capital on infrastructure.

5.5.4 Eastern Cape province

The information below pertains to data collected from six interviewees from private wildlife establishment in located in Eastern Cape province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.4.1 Demographic information of private wildlife establishments in the Eastern Cape province

- **Size of wildlife establishment**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishment owners interviewed from the Eastern Cape province. Six interviewees gave responses to this question. Figure 5.52 summarises this information.

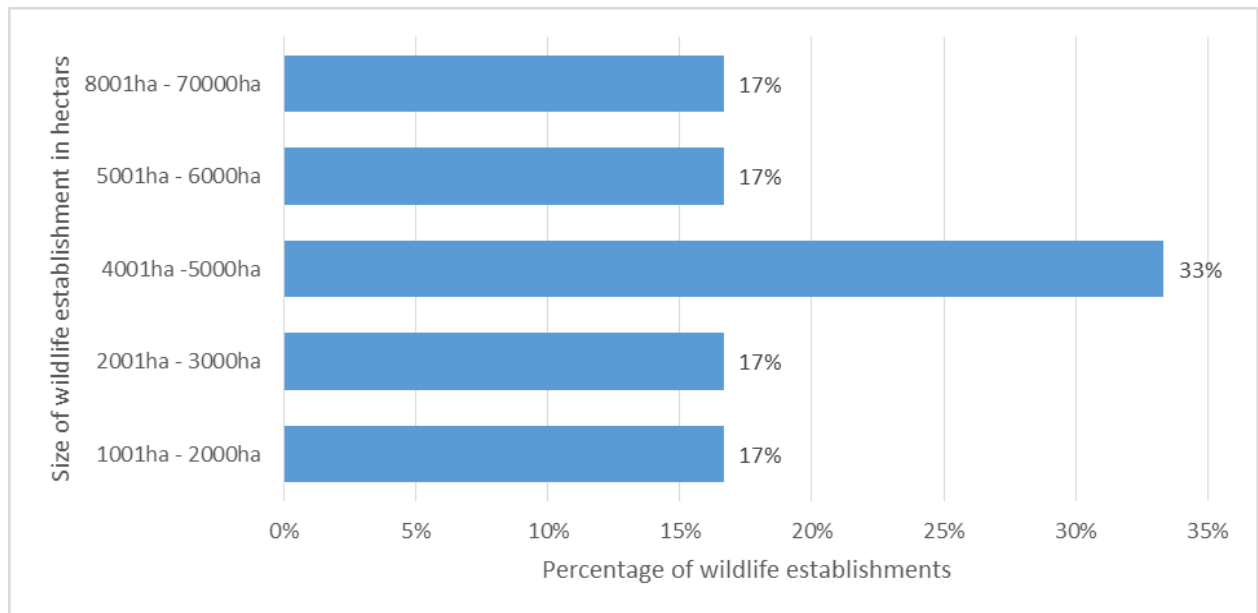


Figure 5.52: Size of wildlife establishments in the Eastern Cape province

The average size of all private wildlife establishments in the Eastern Cape province is 10 750ha. However, one private wildlife establishment is 45 000ha and, if this large private wildlife establishment is removed, the average size of private wildlife establishments is 3 900ha. In total, 33% of interviewees indicate that the land size of their private wildlife establishments is between 4 001 and 5 000ha (interviewees 153 and 155). This is followed by 17% of private wildlife establishments that are between 1 001 and 2 000ha (interviewee 183), 2 001 and 3 000ha (interviewee 5), 5 001 and 6 000ha (interviewee 99) and between 8 001 and 70 000ha (interviewee 120) in size.

- **Species information**

Questions 5 and 6 of the research instrument aimed to analyse species owned on the private wildlife establishments interviewed from the Eastern Cape province. Table 5.15 summarises this information.

Table 5.15: Species on Eastern Cape province's private wildlife establishments

	Elephant	Hippopotamus	Sharpe's grysbok	Rhino (black)	Rhino (white)	Suni	Tsessebe	Crocodile	Duiker (blue)	Klipspringer	Leopard
Number of respondents	1	1	1	1	1	1	1	2	2	2	2
Percentage of respondents	17 %	17 %	17 %	17 %	17%	17%	17%	33%	33%	33%	33 %
	Lion	Oribi	Lechwe	Red hartebeest	Zebra (Burchell's)	Black wildebeest	Bontebok	Bush pig	Eland	Gemsbok	Giraffe
Number of respondents	2	2	4	4	4	5	5	5	5	5	5
Percentage of respondents	33 %	33 %	67 %	67 %	67%	83%	83%	83%	83%	83%	83 %
	Impala	Kudu	Reedbuck mountain	Waterbuck	Aardvark	Buffalo	Duiker (common)	Sable	Springbok	Steenbok	
Number of respondents	5	5	5	5	6	6	6	6	6	6	
Percentage of respondents	83 %	83 %	83 %	83 %	100 %	100 %	100 %	100 %	100 %	100 %	

Six interviewees (100%) own aardvark, buffalo, common duiker, sable, springbok and steenbok. Five interviewees (83%) own black wildebeest, bontebok, bush pig, eland, gemsbok, giraffe, impala, kudu, mountain reedbuck and waterbuck. Four interviewees (67%) own Burchell's zebra, red hartebeest, lechwe, blue wildebeest and blesbok. Three respondents (50%) own ostrich, nyala and roan. The remainder of the species are owned by less than 50% of respondents in the Eastern Cape province.

- **Years operational**

Question 7 of the research instrument aimed to determine years of operation of the private wildlife establishments interviewed from the Eastern Cape province. Five interviewees gave responses to this question. Figure 5.53 summarises this information.

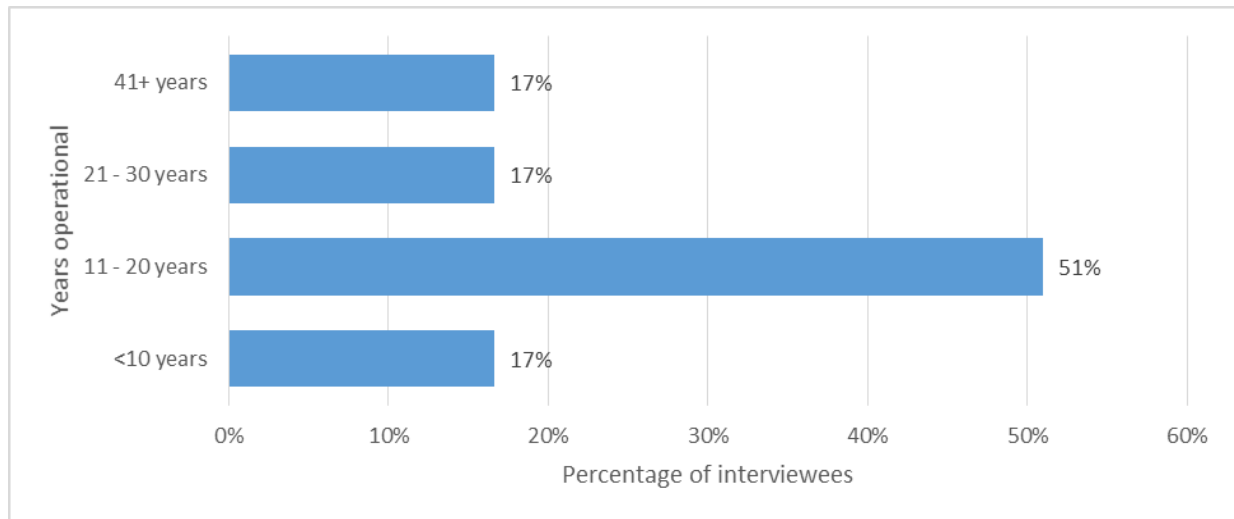


Figure 5.53: Years of operation in the Eastern Cape province

On average, the private wildlife establishment owners interviewed in the Eastern Cape province have been operating for 27 years. One private wildlife establishment has been operating for 81 years. The private wildlife establishments that have been operating for the second longest have been operating for 24 years. This confirms that this province is one of the oldest involved in game farming and wildlife tourism (Sanparks, 2018). If the private wildlife establishment that has been operating for 81 years is removed, the average years of operation for private wildlife establishment owners of the Eastern Cape drops to 16 years. In total, 51% of the private wildlife establishments of interviewees have been in operation for between 11 and 20 years. The interviewee numbers are 5, 120, 183. The remaining three interviewees have been in operation for less than 10 years (17%), between 20 and 30 years (17%) and more than 41 years (17%), respectively.

5.5.4.2 Land-use in the Eastern Cape province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners interviewed from the Eastern Cape province. Six interviewees gave responses to this question. Table 5.16 summarises this information.

Table 5.16: Breeding practices on the Eastern Cape province's private wildlife establishments

			High value			Plains game		
			Controlled environments	Semi-extensive	Extensive	Controlled environments	Semi-extensive	Extensive
Number of interviewees	5	6	2	2	3	1	3	4
Average percent breeding	26%	74%	4%	9%	10%	1%	25%	53%

- ***High value species-breeding***

Five interviewees from the Eastern Cape allocate an average of 26% to breeding of high value game. The interviewees also indicated that, on average, 10% involve breeding high value game in an extensive environment, 9% in an extensive environment and 4% in a controlled environment.

- ***Plains game-breeding***

Six interviewees allocate an average of 74% to breeding of plains game. The interviewees also indicated that 53% of plains game is bred in an extensive environment, 25% in a semi extensive environment and 1% in a controlled environment.

Overall, interviewees indicated that plains game is bred in extensive environments.

- **Land-use and production output**

Question 10 of the research instrument summarises the average production output generated from the private wildlife establishments interviewed from the Eastern Cape province. Six interviewees gave responses to this question. Figure 5.54 summarises this information.

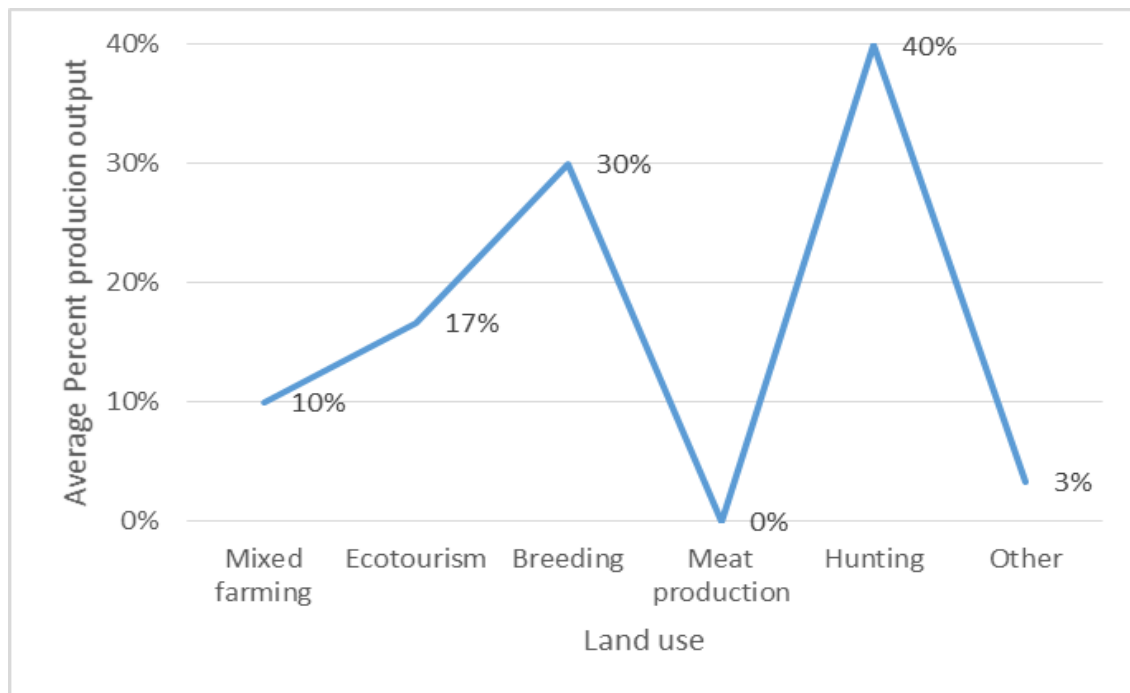


Figure 5.54: Average production output in the Eastern Cape province

On average, the largest percentage of average production output stems from hunting (40%) which is followed by breeding (30%). This province had the second largest percentage (40%) allocated to hunting compared to the other provinces, with the exception of the Northern Cape province which had 41% allocated to hunting. In addition, an average of 17% of production output stems from ecotourism, 10% from mixed farming and one interviewee (3%) from other unknown land-use forms. The interviewees that generate production output from hunting are 99, 120, 154, 155 and 183 and interviewee 55, who indicated that average production output is generated from other land-uses but did not indicate what 'other' entailed. The results are consistent with secondary data that state that the Eastern Cape province is a popular hunting destination that assists with economic growth (van der Merwe, *et al.*, 2014:380). Ecotourism is also higher in the Eastern Cape than in the other provinces, with the exception of KwaZulu-Natal.

- **Capital income generated from land-use forms**

Question 12 of the research instrument determined the average income generated from the private wildlife establishment owners of the Eastern Cape. Six interviewees gave responses to this question. Figure 5.58 summarises this information.

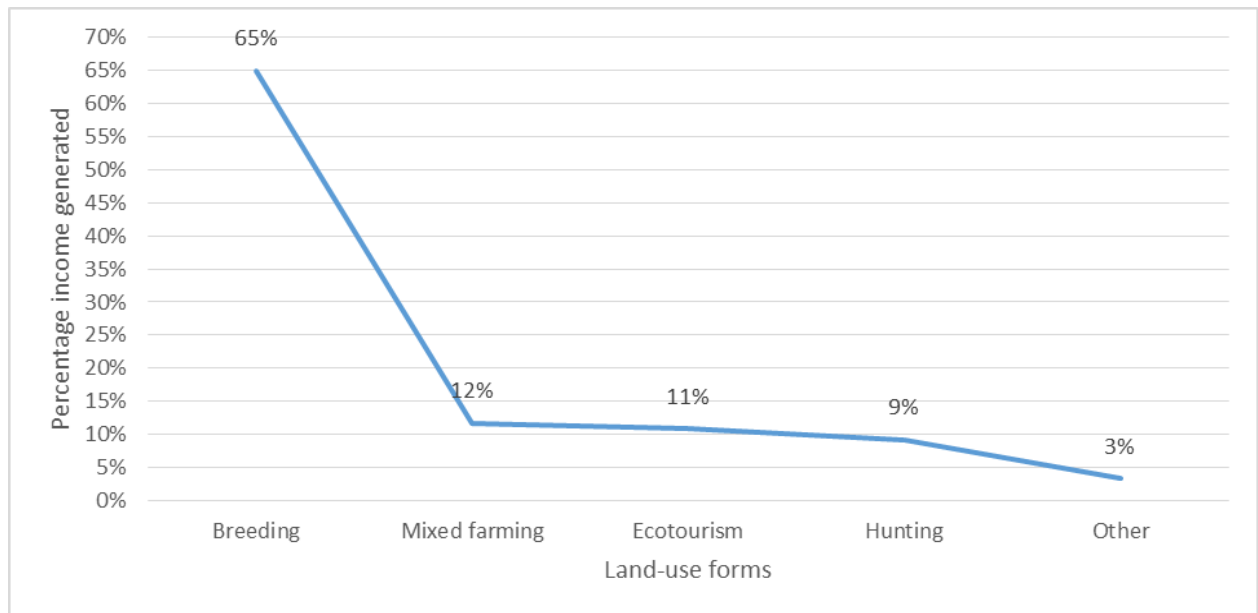


Figure 5.55: Average income generated in the Eastern Cape province

The largest percentage of average income generated stems from breeding (65%) which was indicated by interviewees 5, 99, 120, 154 and 183. This, in a sense, contradicts the previous finding, which indicated hunting as the largest production output land-use form, it was expected that hunting would be the highest here as well. There is no specific clarification for this besides that breeding generates the highest income. The average income from other land-use forms include mixed farming (12%), ecotourism (11%), hunting (9%) and other land-use forms by interviewee 155 (3%) who did not specify what other land-use forms entailed. The largest percentage of average income is generated from hunting, even though the highest average production output stems from hunting and breeding. Interestingly, hunting has a high production output, but breeding generates far more income than hunting.

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determines the average expenditure based on capital layout of the private wildlife establishment owners interviewed from the Eastern Cape province. Four interviewees gave responses to this question. Figure 5.59 summarises this information.

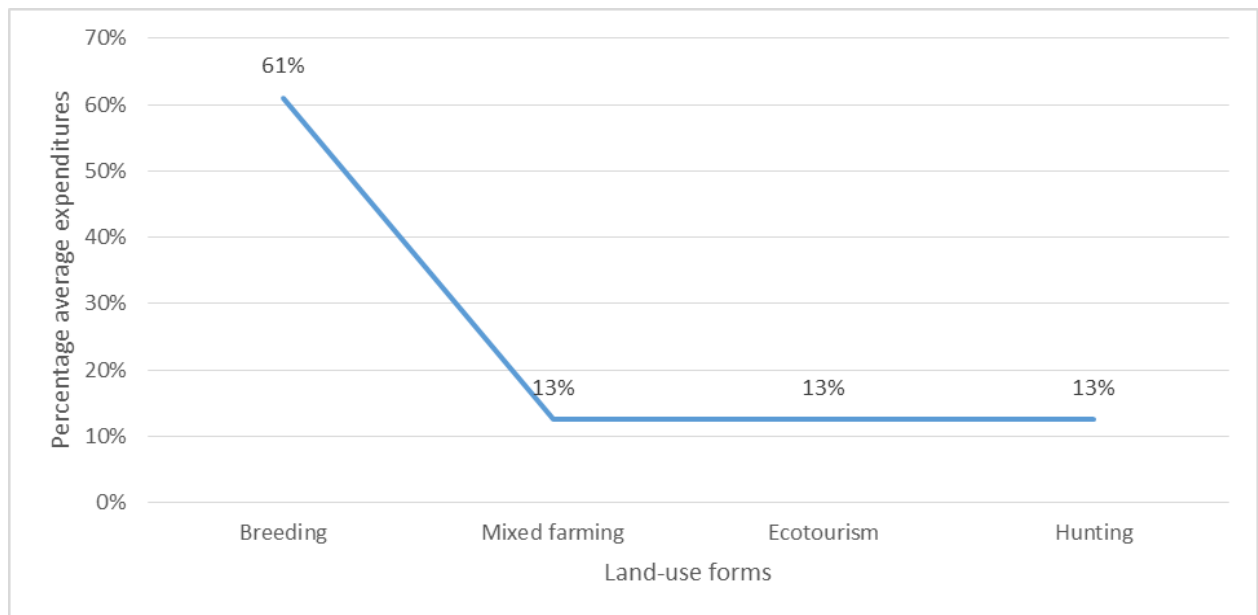


Figure 5.56: Average expenditure based on capital layout in the Eastern Cape province

On average, the largest percentage of expenditure based on capital layout originates from breeding (61%) which was indicated by interviewees 5, 120, 155 and 183. The average expenditures based on capital layout from the other pillars are 13% from mixed farming, 13% from ecotourism and 13% from hunting. Breeding therefore generates income and has expenditure based on capital layout associated with it, but has a very low production output.

5.5.4.3 Capital spent (land, animals and infrastructure) in the Eastern Cape province

Question 14 of the research instrument determines the capital spent on land, animals and infrastructure of private wildlife establishments interviewed from the Eastern Cape province. Figure 5.57, 5.58 and 5.59 summarises this information.

- ***Capital spent on land***

The information in Figure 5.57 summarises the capital spent on land in the Eastern Cape province. Four interviewees gave responses to this question.

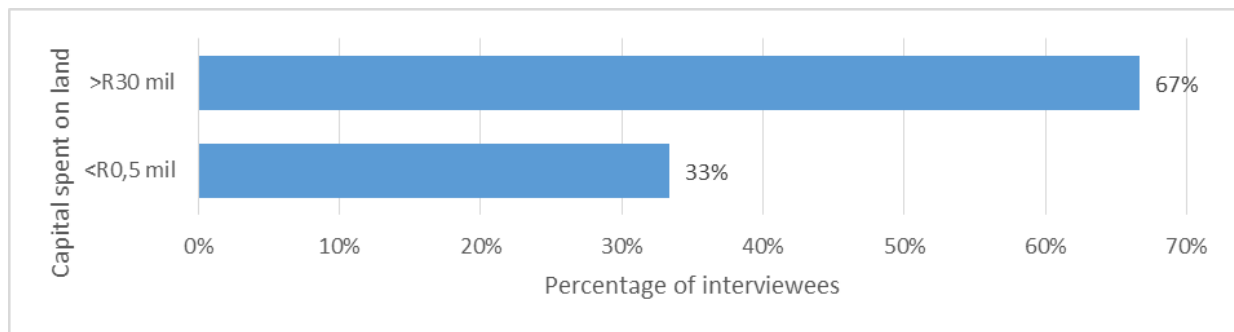


Figure 5.57: Capital spent on land in the Eastern Cape province

Interviewees 99 and 155 have spent more than R30 million of capital on land whilst interviewee 120 (33%) spent less than R500 000 of capital on land.

- ***Capital spent on animals***

The information in Figure 5.58 summarises the capital spent on animals in the Eastern Cape province. Four interviewees gave responses to this question.

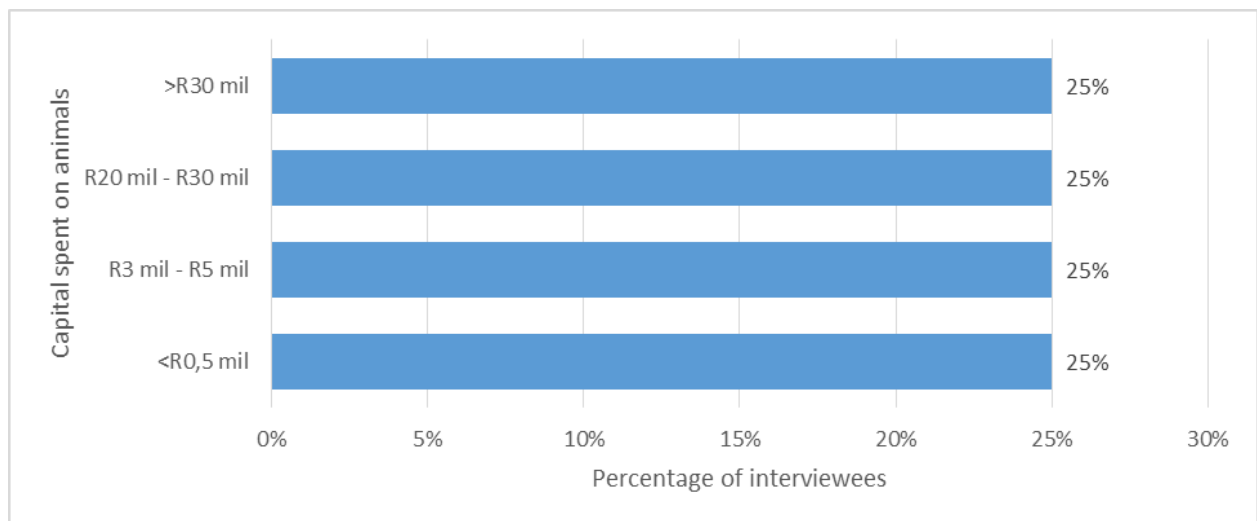


Figure 5.58: Capital spent on animals in the Eastern Cape province

The numbers of the interviewees that indicated capital spent on animals are 99, 120, 154 and 155 and are equally divided between spending less than R500 000, between R3 and R5 million, R20 and R30 million and more than R30 million on animals.

- ***Capital spent on infrastructure***

The information in Figure 5.59 summarises the capital spent on infrastructure in the Eastern Cape province. Four interviewees gave responses to this question.

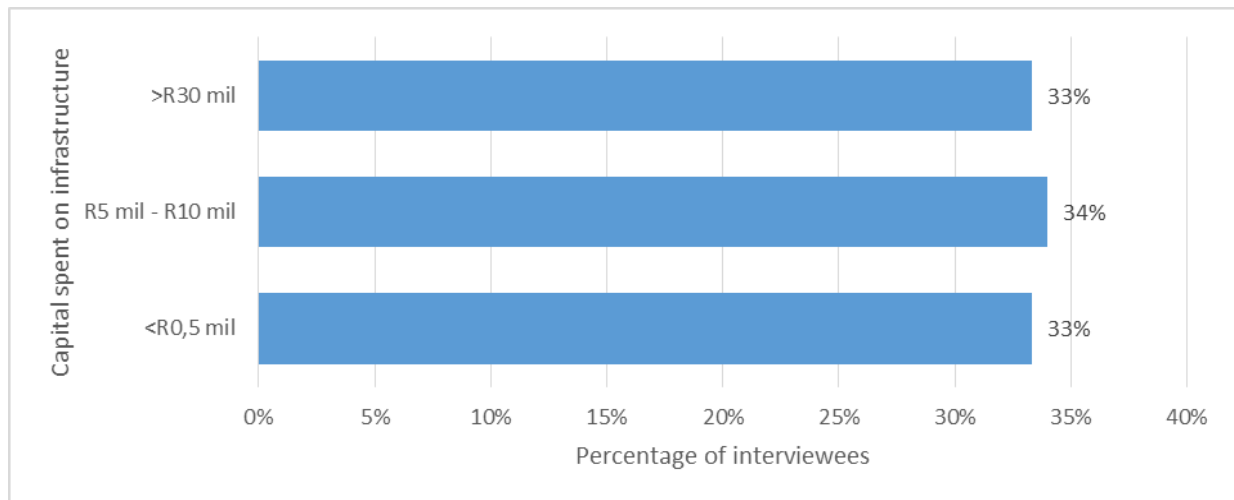


Figure 5.59: Capital spent on infrastructure in the Eastern Cape province

The three interviewees that indicated that capital was spent on infrastructure are interviewee numbers 99, 120 and 156 and are equally divided between spending less than R500 000, between R5 and R10 million and more than R30 million.

5.5.5 Western Cape province

The information below pertains to data collected from three private wildlife establishments located in the Western Cape province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.5.1 Demographic information of private wildlife establishments in the Western Cape province

- **Size of wildlife establishment**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishments interviewed from the Western Cape province. Three interviewees gave responses to this question. Figure 5.60 summarises the information.

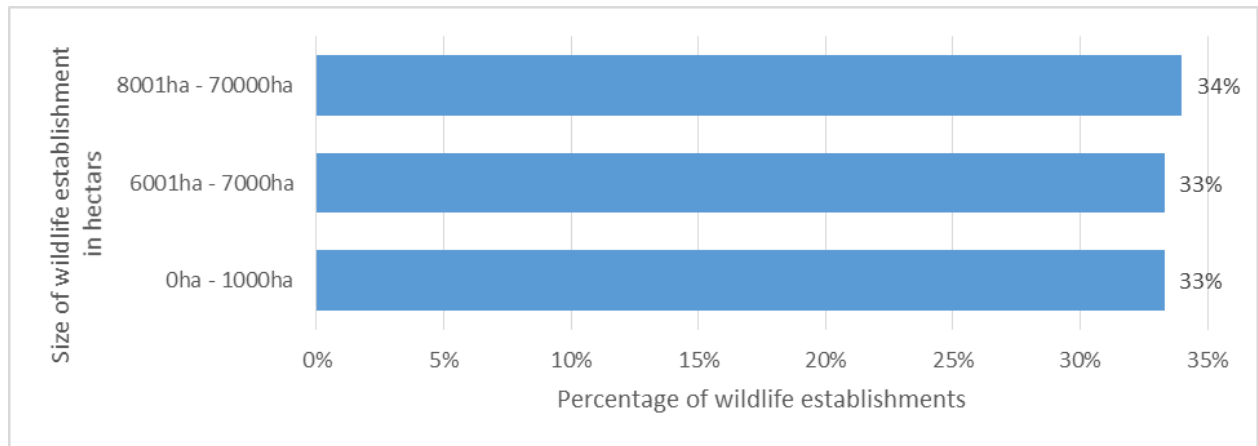


Figure 5.60: Size of wildlife establishments in the Western Cape province

The average size of all private wildlife establishments in the Western Cape province is 5 553ha. The three private wildlife establishment owners indicated that the land sizes ranges from small to large and the sizes given were 360ha by interviewee 156, 6 300ha by interviewee 142 and 10 000ha by interviewee 156. The three interviewees from the Western Cape province that indicated the size of the wildlife establishments are equally split between private wildlife establishments that are smaller than 1 000ha, between 6 001 and 7 000ha and 8 001 and 70 000ha.

- **Species information**

Questions 5 and 6 aimed to analyse species owned on the private wildlife establishment owners interviewed from the Western Cape province. Table 5.17 summarises this information.

Table 5.17: Species on Western Cape province's private wildlife establishments

	Bontebok	Buffalo	Crocodile	Elephant	Giraffe	Grey rhebuck	Leopard	Lion	Reedbuck	Rhino (white)	Sable	Steenbok	
Number of interviewees	1	1	1	1	1	1	1	1	1	1	1	1	
Percentage of interviewees	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	
	Zebra (mountain)	Blesbok	Blue wildebeest	Black wildebeest	Duiker (common)	Eland	Gemsbok	Hippopotamus	Kudu	Waterbuck	Red hartebeest	Springbok	Zebra (Burchell's)
Number of interviewees	1	2	2	2	2	2	2	2	2	2	3	3	3
Percentage of interviewees	33%	67%	67%	67%	67%	67%	67%	67%	67%	67%	100%	100%	100%

All three interviewees own red hartebeest, springbok and Burchell's zebra. Two interviewees (67%) own blesbok, blue wildebeest, black wildebeest, common duiker, eland, gemsbok, hippopotamus, kudu and waterbuck. The remaining species are owned by 33% of interviewees or less.

- Years operational**

Question 7 aimed to analyse the years the private wildlife establishment has been operational. Three interviewees gave responses to this question. Figure 61 summarises this information.

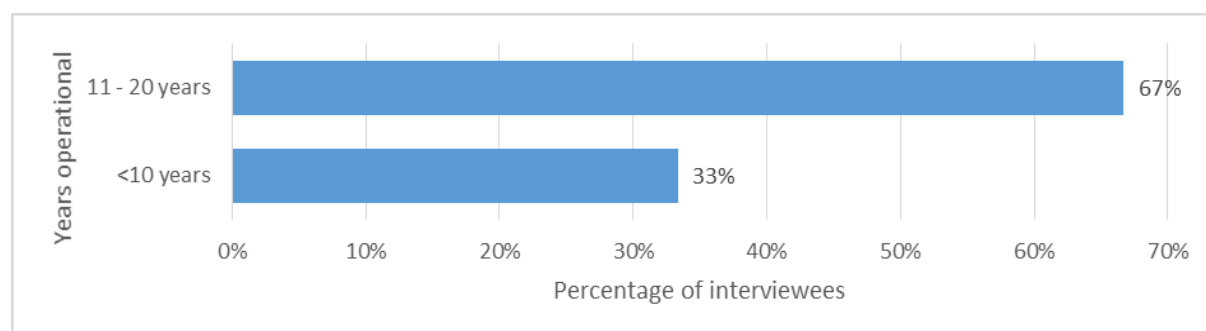


Figure 5.61: Years of operation in the Western Cape province

On average, the private wildlife establishment owners interviewed in the Western Cape province have been operating for 13 years. Interviewees 142 and 156 have been in operation between 11 and 20 years and interviewee 106 for less than 10 years.

5.5.5.2 Land-use in the Western Cape province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners interviewed from the Western Cape province. Two interviewees gave responses to this question. Table 5.18 summarises this information.

Table 5.18: Breeding practices on the Western Cape province's private wildlife establishments

	Total High Value	Total Plains Game	High Value			Plains Game		
			Controlled Environments	Semi-extensive	Extensive	Controlled Environments	Semi-extensive	Extensive
Number of interviewees	1	2	1	0	0	1	1	0
Average percentage breeding	17%	50%	17%	0	0	17%	33%	0

- **High value species-breeding**

One interviewee from the Western Cape allocated an average of 17% of breeding to high value game in a controlled environment.

- **Plains game-breeding**

Two interviewees allocated an average of 50% of breeding to plains game in controlled (17%) and semi-extensive (33%) environments.

The Western Cape interviewees mostly breed plains game in semi-extensive environments.

- **Land-use and production output**

Question 10 of the research instrument determined the average production output of the private wildlife establishments interviewed from the Western Cape. Three interviewees gave responses to this question. Figure 5.62 summarises this information.

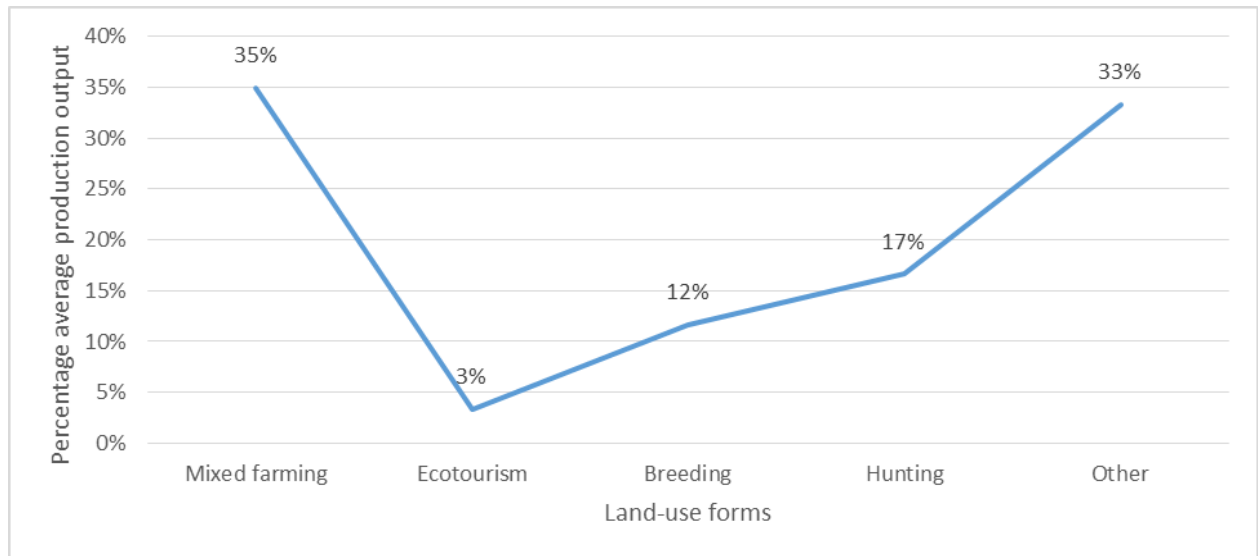


Figure 5.62: Average production output in the Western Cape province

On average, the highest average production output is received from mixed farming (35%) by interviewees 106 and 142 and “other” land-use forms (33%) from interviewee 156. Other land-use forms from which production output is generated include wine, religious retreats, team building activities and a mountain club. The average production output received from other land-use forms include production output received from hunting (17%), breeding (12%) and ecotourism (3%).

- **Capital income generated from land-use forms**

Question 12 of the research instrument determined the income generated from the private wildlife establishments interviewed from the Western Cape province. Two interviewees gave responses to this question. Figure 5.63 summarises this information.

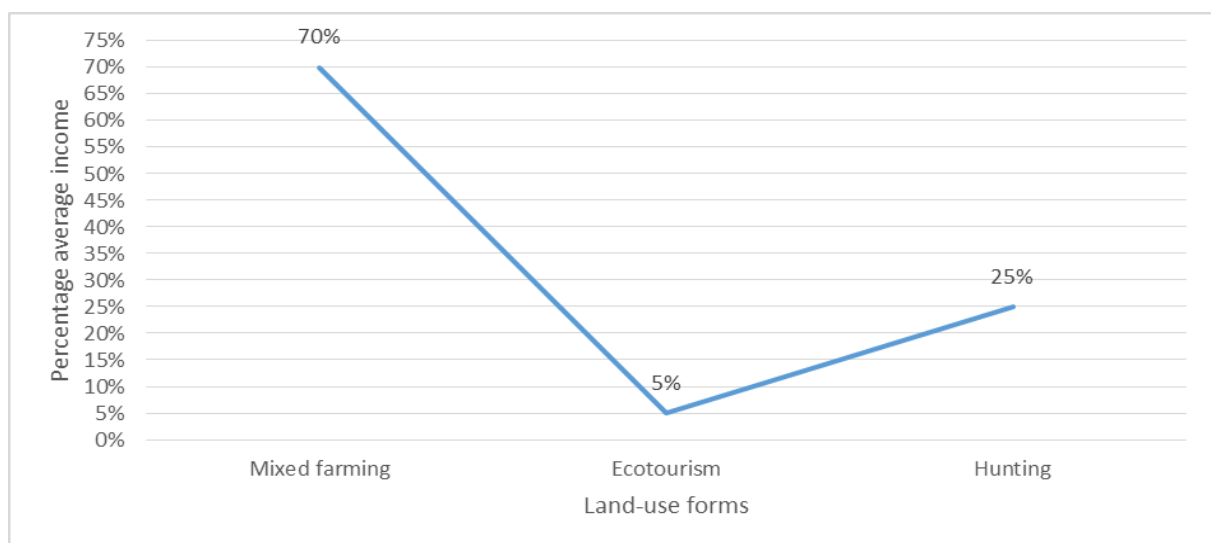


Figure 5.63: Average capital income generated in the Western Cape province

Income is generated from three land-use forms that include mixed farming (70%) by interviewees 106 and 142 and hunting (25%) and ecotourism (5%) by interviewee 142. Breeding, mentioned in all other provinces as part of income generated, was not mentioned by any of the interviewees of the Western Cape province. Reasons for not incorporating breeding may be due to strict legislation that relates to breeding, hybridisation and translocation of game, as discussed in chapter 3.

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determined the average expenditure based on capital layout of the private wildlife establishments interviewed from the Western Cape province. Two interviewees gave responses to this question. Figure 5.64 summarises this information.

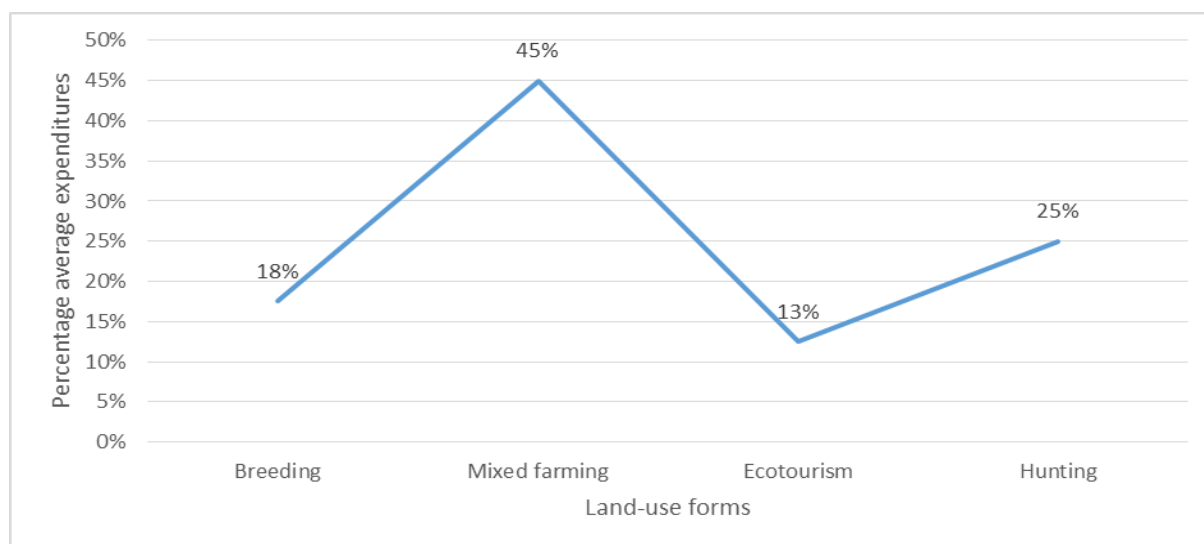


Figure 5.64: Average expenditure based on capital layout in the Western Cape province

On average, expenditure based on capital layout stem from mixed farming (45%) by interviewees 146 and 106, hunting (25%) and ecotourism (13%) by interviewee 142 and breeding (18%) by interviewee 106. Breeding has expenditures associated with land-use, but no income. It may be assumed that the interviewees have started to invest in breeding and started to invest in animals and camps with the aim of incorporating breeding.

5.5.5.3 Capital spent (land, animals and infrastructure) in the Western Cape province

Question 14 of the research instrument determined the capital spent on land, animals and infrastructure of private wildlife establishments interviewed from the Western Cape province. Figure 5.65, 5.66 and 5.67 summarises this information.

- **Capital spent on land**

The information in Figure 5.65 summarises the capital spent on land in the Western Cape province. Three interviewees gave responses to this question.

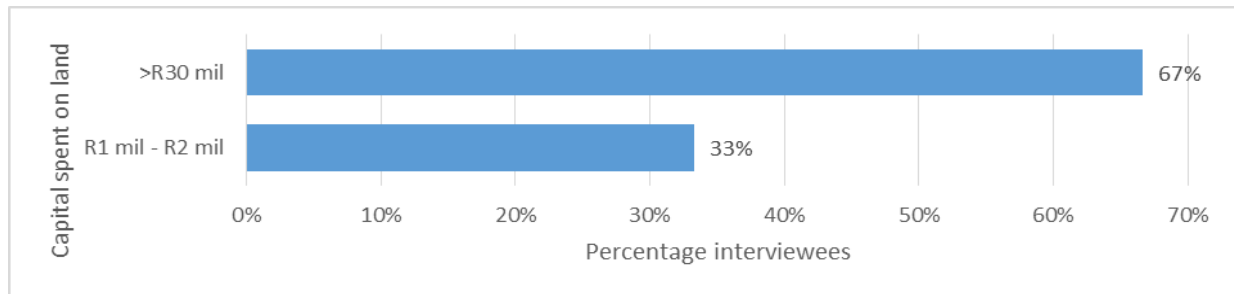


Figure 5.65: Capital spent on land in the Western Cape province

Interviewees 106 and 156 (66%) have spent more than R30 million of capital on infrastructure whilst interviewee 142 (33%) has spent between R1 and R2 million of capital on infrastructure.

- **Capital spent on animals**

The information in Figure 5.66 summarises the capital spent on animals in the Western Cape province.

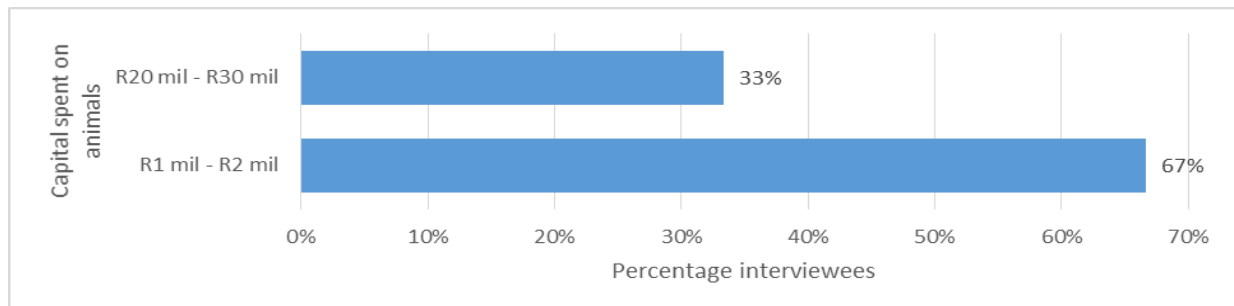


Figure 5.66: Capital spent on animals in the Western Cape province

Interviewees 106 and 142 (66%) have spent between R1 and R2 million of capital on animals whilst interviewee 156 (33%) has spent between R20 and R30 million of capital on animals.

- **Capital spent on infrastructure**

The information in Figure 5.67 summarises the capital spent on infrastructure in the Western Cape province. Three interviewees gave responses to this question.

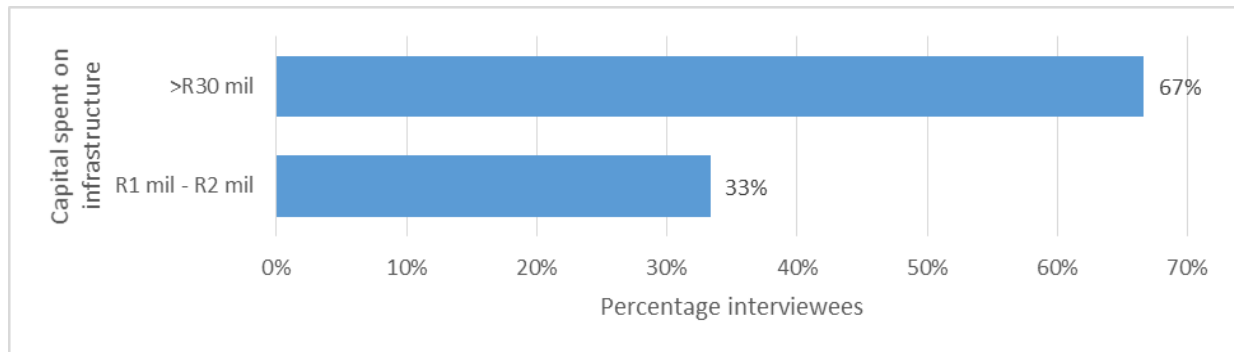


Figure 5.67: Capital spent on infrastructure in the Western Cape province

Interviewees 106 and 156 (66%) have spent more than R30 million of capital on infrastructure whilst interviewee 142 (33%) has spent between R1 and R2 million of capital on infrastructure.

5.5.6 Northern Cape province

The information below pertains to data collected from thirty-six private wildlife establishments located in the Northern Cape province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.6.1 Demographic information of private wildlife establishments in the Northern Cape province

- **Size of wildlife establishment**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishments interviewed from the Northern Cape province. Thirty-four interviewees gave responses to this question. Figure 5.68 summarises this information.

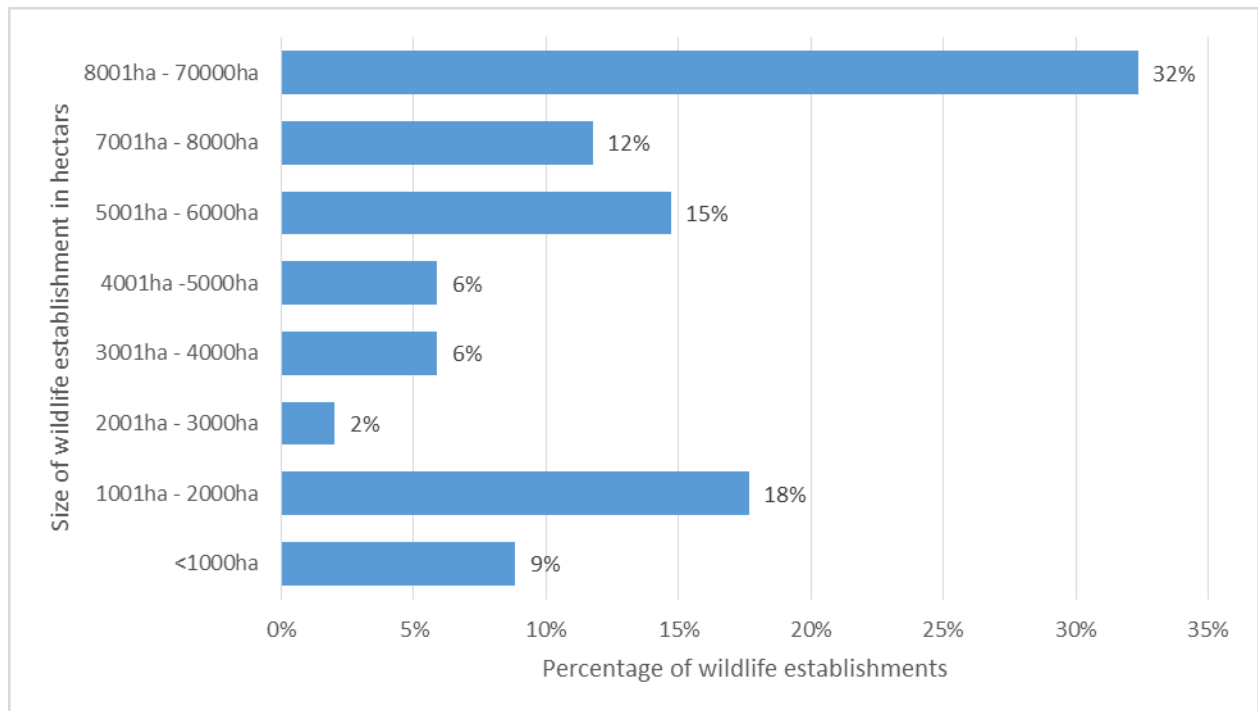


Figure 5.68: Size of wildlife establishments in the Northern Cape province

The average size of all private wildlife establishments in the Northern Cape is 11 440ha that is larger than that in the other provinces. Drier regions (such as the Northern Cape province) need larger farms because the carrying capacity is weaker than for regions (such as the Mpumalanga province) that receive a higher rainfall (Bothma & du Toit, 2016:3). Interviewees 9, 39, 40, 45, 50, 97, 98, 114, 130, 132, 143, 164 and 150 indicated that wildlife establishments are between 8 001 and 70 000ha in size. This is followed by 18% of private wildlife establishments that are between 1 001 and 2 000ha, 15% that are between 5001 and 6 000ha and 12% that are between 7 001 and 8 000ha. The rest are below 10%.

- **Species information**

Questions 5 and 6 of the research instrument aimed to determine species owned on the private wildlife establishments interviewed from the Northern Cape province. Table 5.19 summarises the information as it pertains to the Northern Cape province.

Table 5.19: Species on Northern Cape province's private wildlife establishments

	Duiker (Red)	Hippopotamus	Sharpe's grysbok	Crocodile	Duiker (blue)	Oribi	Rhino (black)	Grey rhebok	Leopard	Bush pig	Bushbuck	Zebra (mountain)	Lion
Numbers of respondents	1	1	1	2	2	2	3	4	4	5	5	6	7
Percentage of respondents	3%	3%	3%	6%	6%	6%	8%	11%	11%	14%	14%	17%	19%
	Reedbuck mountain	Rhino (white)	Klipspringer	Lechwe	Bontebok	Tsessebe	Buffalo	Nyala	Giraffe	Ostrich	Sable	Waterbuck	Roan
Numbers of respondents	11	11	12	12	13	13	14	15	17	17	18	18	19
Percentage of respondents	31%	31%	33%	33%	36%	36%	39%	42%	47%	47%	50%	50%	53%
	Zebra (Burchell's)	Aardvark	Red hartebeest	Blesbok	Blue wildebeest	Black wildebeest	Duiker (common)	Impala	Eland	Steenbok	Kudu	Gemsbok	Springbok
Numbers of respondents	19	20	20	21	21	21	24	24	26	26	28	30	32
Percentage of respondents	53%	56%	56%	58%	58%	58%	67%	67%	72%	72%	78%	83%	89%

Thirty-two interviewees (89%) own springbok. This is followed by 30 interviewees (83%) who own gemsbok, 28 interviewees (78%) own kudu and 26 interviewees (72%) own eland and steenbok respectively. In addition, 24 interviewees (67%) own common duiker and impala and 21 interviewees (58%) own blesbok, blue wildebeest and black wildebeest. Aardvark and red hartebeest are owned by 20 respondents (56%) whilst blesbok, blue wildebeest and black wildebeest are owned by 21 interviewees (58%). Nineteen respondents (53%) own roan and Burchell's zebra. The other species are owned by less than 50% of the interviewees of the Northern Cape province.

- **Years operational**

Question 7 of the research instrument aimed to determine the years the private wildlife establishments interviewed from the Northern Cape province have been operational. Thirty-four interviewees gave responses to this question. Figure 5.69 analyses this information.

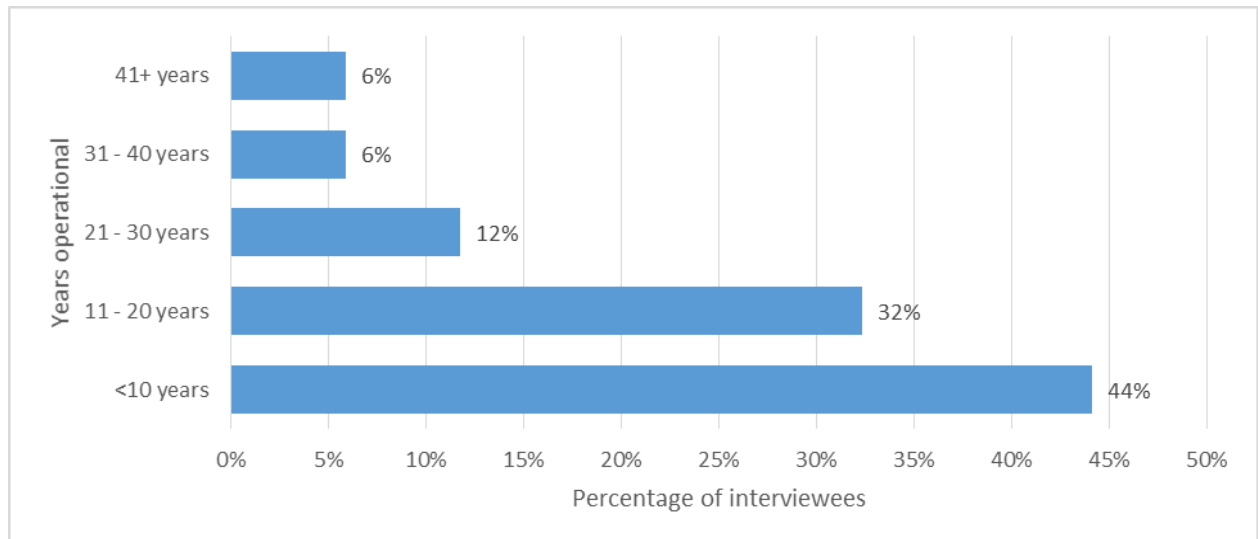


Figure 5.69: Years of operation in the Northern Cape province

On average, the private wildlife establishment owners interviewed in the Northern Cape have been operating for 18 years. The largest percentage of private wildlife establishments (44%) have been operating for less than 10 years, which was indicated by interviewees 2, 12, 26, 43, 8, 50, 56, 104, 114, 143, 146, 172, 178, 182 and 184. This is followed by 32% of establishments that have been operating for between 11 and 20 years. In addition, 12% of establishments have been in existence for 21 to 30 years and 6% each between 31 and 40 years and more than 40 years.

5.5.6.2 Land-use in the Northern Cape province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishments owners interviewed from the Northern Cape province. Thirty-six interviewees gave responses to this question. Table 5.20 summarises this information.

Table 5.20: Breeding practices on the Northern Cape province's private wildlife establishments

	Total High Value	Total Plains Game	High Value			Plains Game		
			Controlled Environments	Semi-extensive	Extensive	Controlled Environments	Semi-extensive	Extensive
Number of interviewees	27	34	12	3	17	9	7	22
Average percent breeding	42%	58%	15%	5%	21%	11%	11%	32%

○ ***High value species-breeding***

Twenty-seven interviewees from the Northern Cape province allocate an average of 42% of breeding to high value game. The interviewees also indicated that, on average, 21% involve breeding high value game in an extensive environment, 15% in a controlled environment and 3% in a semi-extensive environment.

○ ***Plains game-breeding***

Thirty-four interviewees from the Northern Cape province allocate an average of 58% of breeding to plains game. The interviewees also indicated that, on average, 32% involve breeding plains game in an extensive environment whilst 11% breed plains game in a controlled and semi-extensive environment respectively.

Overall plains game is bred with in extensive environments

• **Land-use and production output**

Question 10 of the research instrument determined the average production output of the private wildlife establishments from the Northern Cape province whose owners were interviewed. Thirty-six interviewees gave responses to this question. Figure 5.70 summarises this information.

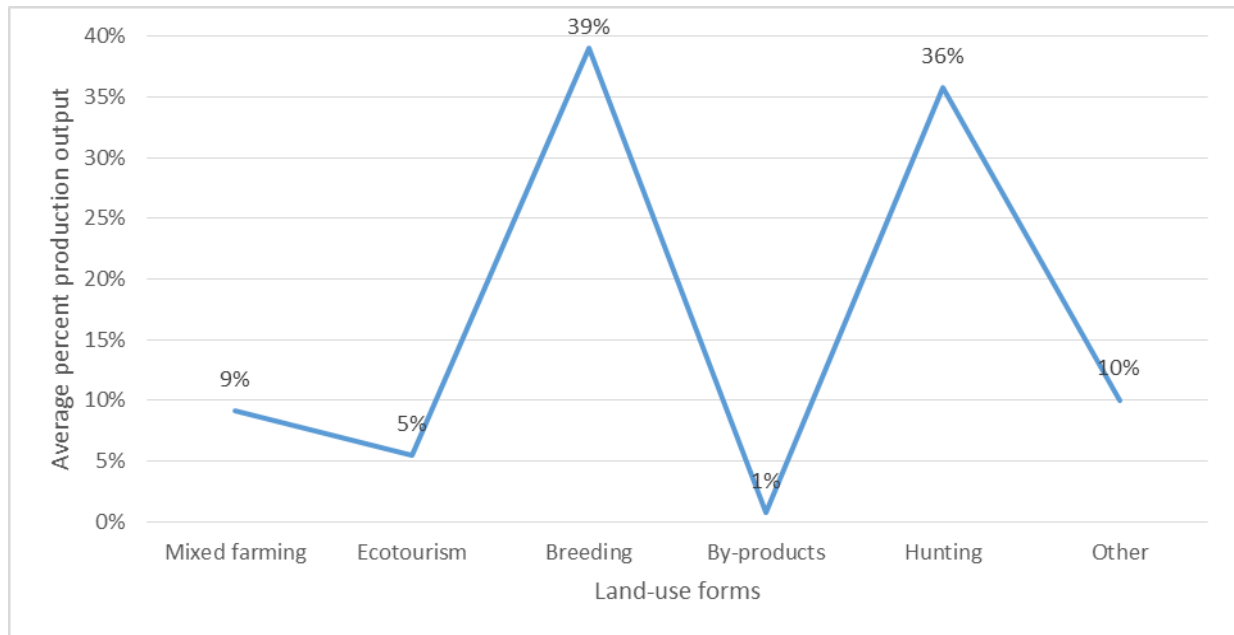


Figure 5.70: Average production output in the Northern Cape province

On average, the largest percentage of production output stems from breeding (39%) which was indicated by interviewees 9, 12, 18, 39, 44, 45, 48, 49, 50, 56, 97, 110, 114, 123, 131, 132, 143, 147, 150, 164, 172, 178 and 182. This was followed by hunting (31%). The average production output from other land-use forms stems from other land-use forms (15%), mixed farming (9%), ecotourism (5%) and by-products (1%). Interviewees that generate production output from other land-uses are interviewee numbers 9, 18, 26, 43, 45, 48, 49, 50 and 146 and these indicated that 'other' includes stock farming for personal consumption and other unknown land-uses.

- **Capital income generated from land-use forms**

Question 12 of the research instrument determined the average income generated from the private wildlife establishments from the Northern Cape province whose owners were interviewed. Thirty-five interviewees gave responses to this question. Figure 5.71 summarises this information.

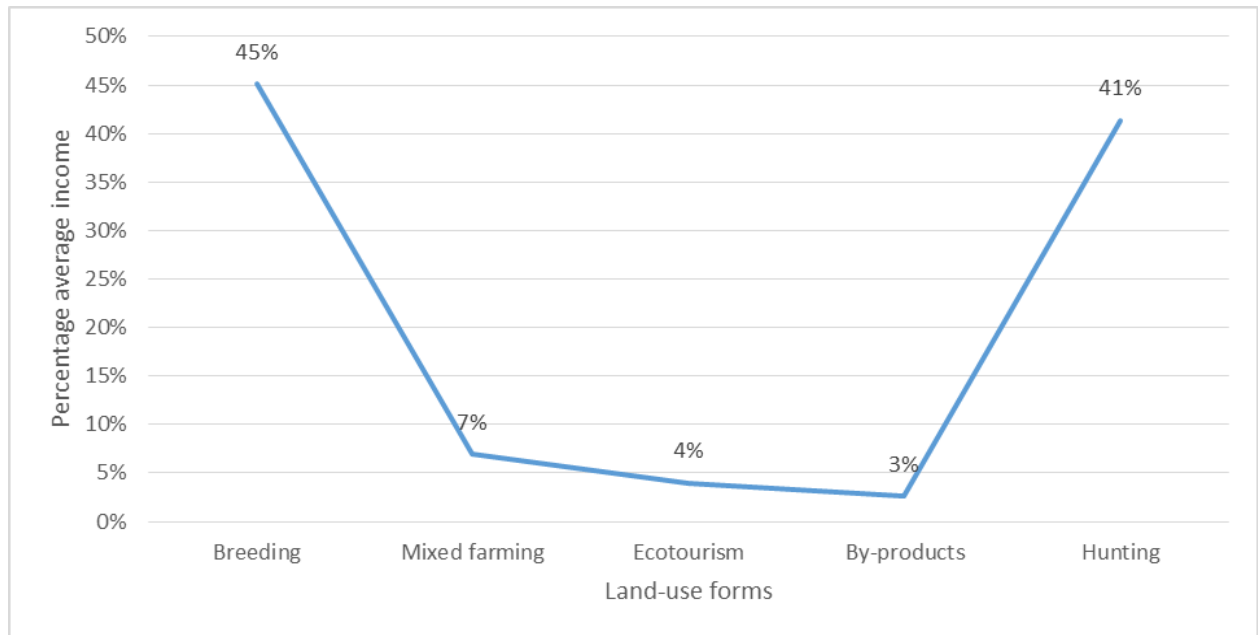


Figure 5.71: Average income generated in the Northern Cape province

On average, the largest percentage of income generated stems from breeding (45%). This was indicated by interviewees 9, 12, 18, 39, 44, 45, 48, 49, 50, 56, 104, 110, 114, 123, 130, 131, 132, 143, 147, 150, 164, 178 and 182. This is followed by hunting (41%). The average income generated from other land-use forms are mixed farming (7%), ecotourism (4%) and by-products (3%).

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determined the average expenditure based on capital layout of the private wildlife establishment owners interviewed from the Northern Cape province. Thirty-five interviewees gave responses to this question. Figure 5.72 summarises this information.

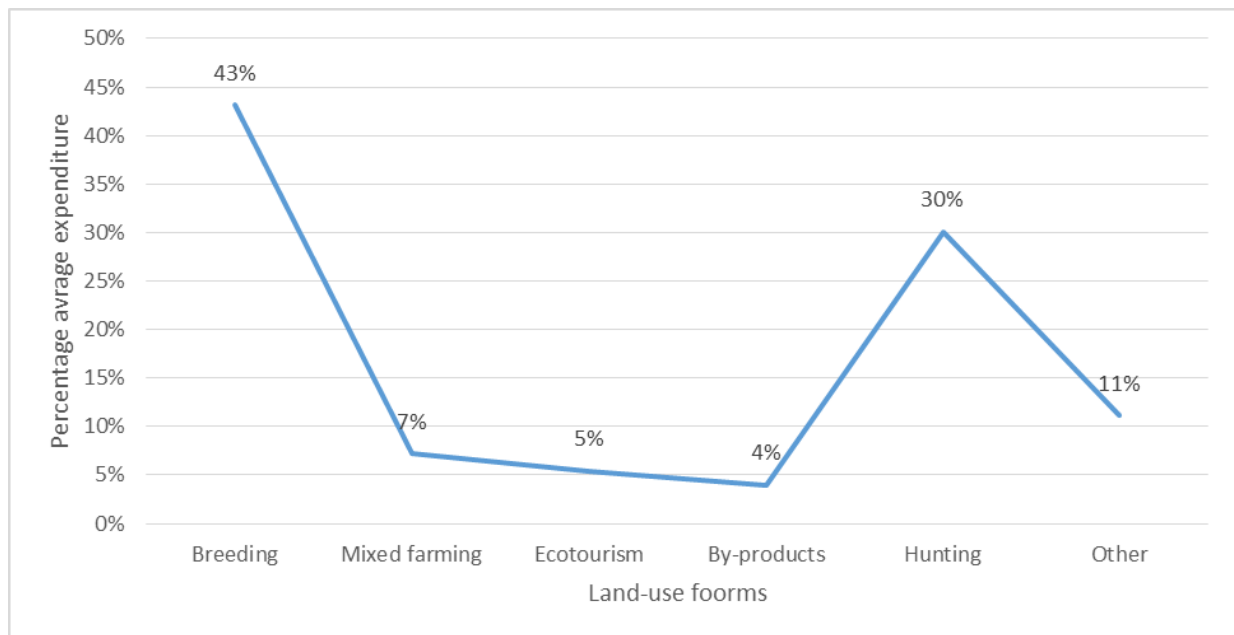


Figure 5.72: Average expenditure based on capital layout in the Northern Cape province

On average, the largest percentage of expenditure based on capital layout comes from breeding (43%). This was indicated by interviewees 9, 12, 18, 39, 44, 45, 48, 49, 50, 56, 97, 104, 110, 114, 130, 131, 132, 143, 164, 178 and 182. This was followed by hunting (30%). Less average expenditure based on capital layout stems from other land-use forms (11%), mixed farming (7%), ecotourism (5%) and by-products (4%). The interviewees that indicated average expenditure based on capital layout stems from other land-uses are 43, 110, 146, 147 and interviewee 150 indicated that 'other' refer to maintenance, employees, wages and salaries.

5.5.6.3 Capital spent on land, animals and infrastructure

Question 14 of the research instrument determined the capital spent on land, animals and infrastructure of private wildlife establishment owners interviewed from the Northern Cape province. Figures 5.73, 5.74 and 5.75 summarise this information.

- ***Capital spent on land***

The information in Figure 5.73 summarises the capital spent on land in the Northern Cape province. Thirty-two interviewees gave responses to this question.

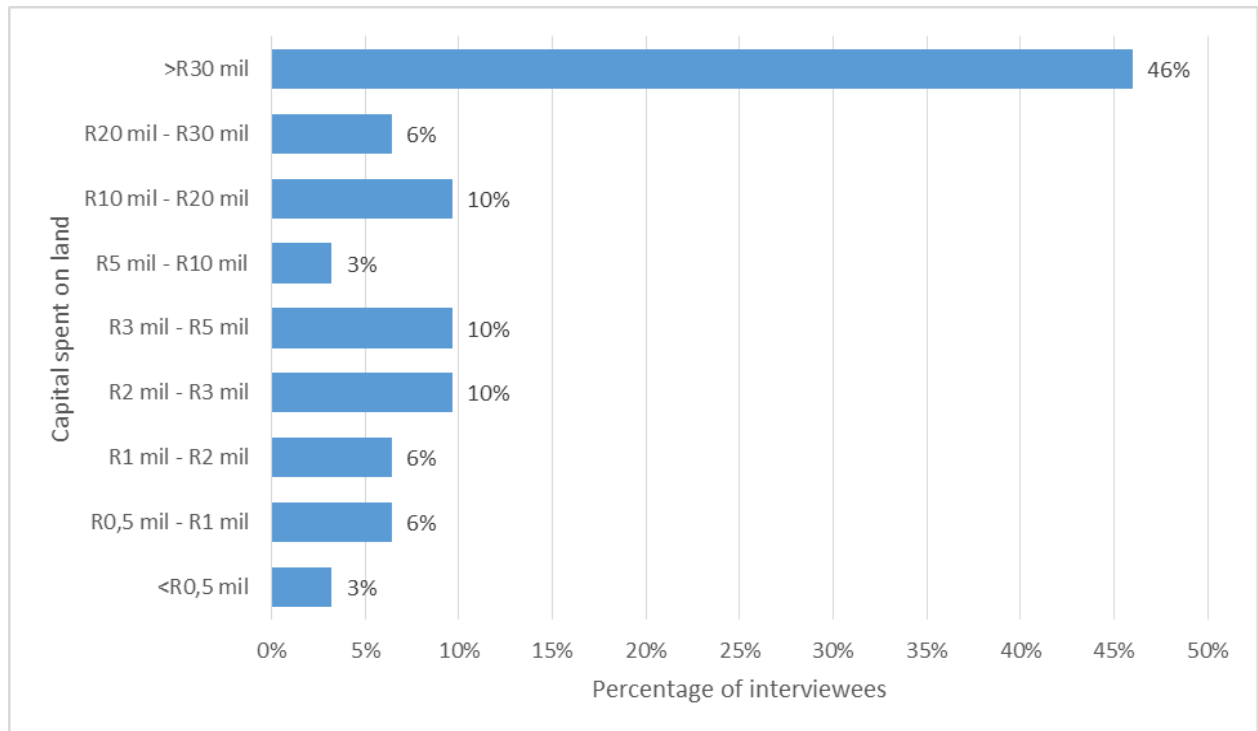


Figure 5.73: Capital spent on land in the Northern Cape province

Interviewee numbers 9, 39, 40, 104, 114, 123, 130, 131, 132, 146, 147, 150 and 164 (46%) spent more than R30 million on land. The rest are all 10% or less.

- ***Capital spent on animals***

The information in Figure 5.74 summarises the capital spent on animals in the Northern Cape province. Thirty-two interviewees gave responses to this question.

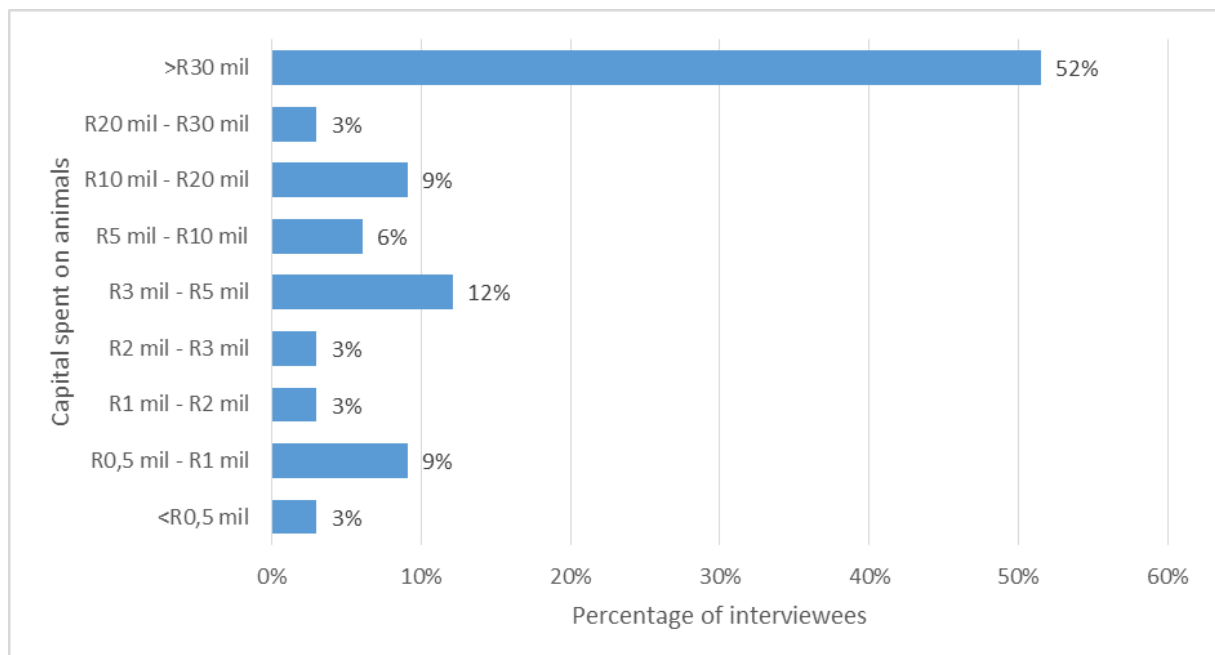


Figure 5.74: Capital spent on animals in the Northern Cape province

Interviewee numbers 9, 39, 40, 45, 97, 104, 110, 114, 123, 130, 131, 132, 146, 147, 150, 162 and 164 (52%) spent more than R30 million on animals whilst 12% spent between R3 million and R5 million of capital on animals. The rest are all 10% or less.

- **Capital spent on infrastructure**

The information in Figure 5.75 summarises the capital spent on infrastructure in the Northern Cape province. Thirty-two interviewees gave responses to this question.

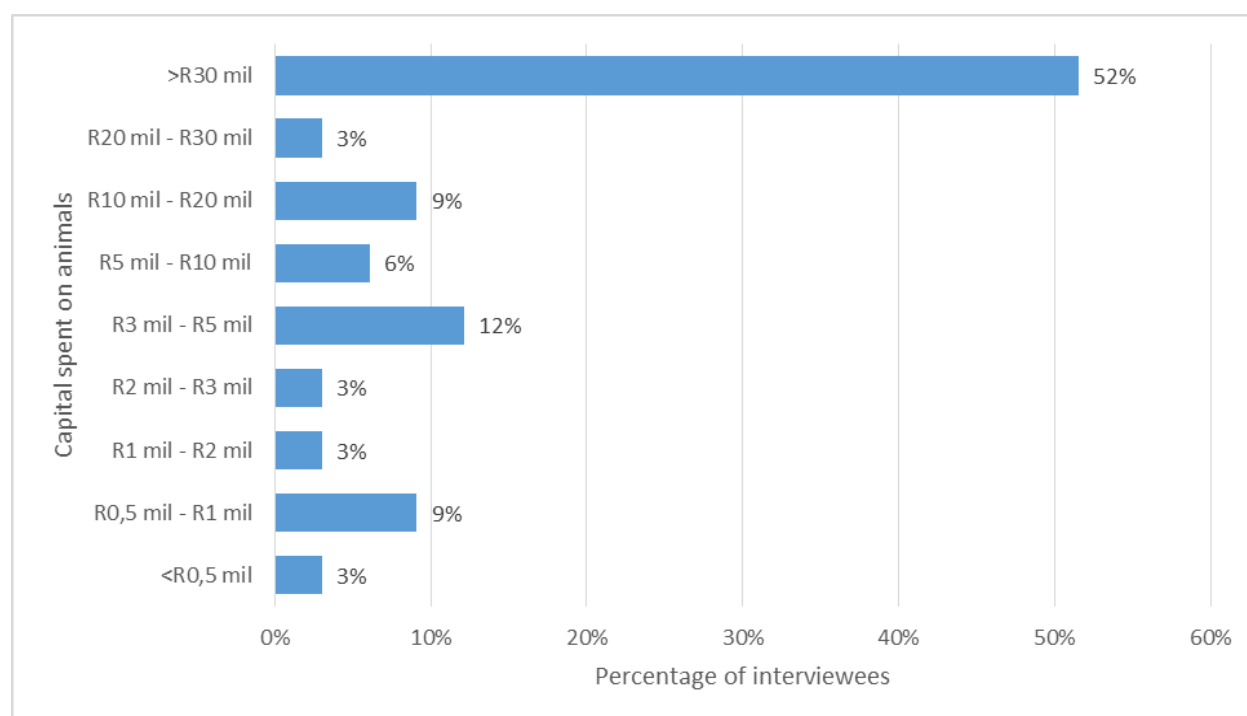


Figure 5.75: Capital spent on infrastructure in the Northern Cape province

Interviewee numbers 9, 39, 40, 104, 114, 123, 131, 132, 146, 147 and 150 (35%) spent more than R30 million on infrastructure whilst 13% spent between R2 million and R3 million and R10 million and R20 million of capital on infrastructure respectively. The rest are all 10% or less.

5.5.7 North West province

The information below pertains to data collected from twenty six private wildlife establishments located in the North West province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.7.1 Demographic information of private wildlife establishments in the North West province

- **Size of wildlife establishments**

Question 4 of the research instrument aimed to determine the land size of the twenty-six private wildlife establishment owners that were interviewed from the North West province. Twenty-six interviewees gave responses to this question. Figure 5.76 summarises the information.

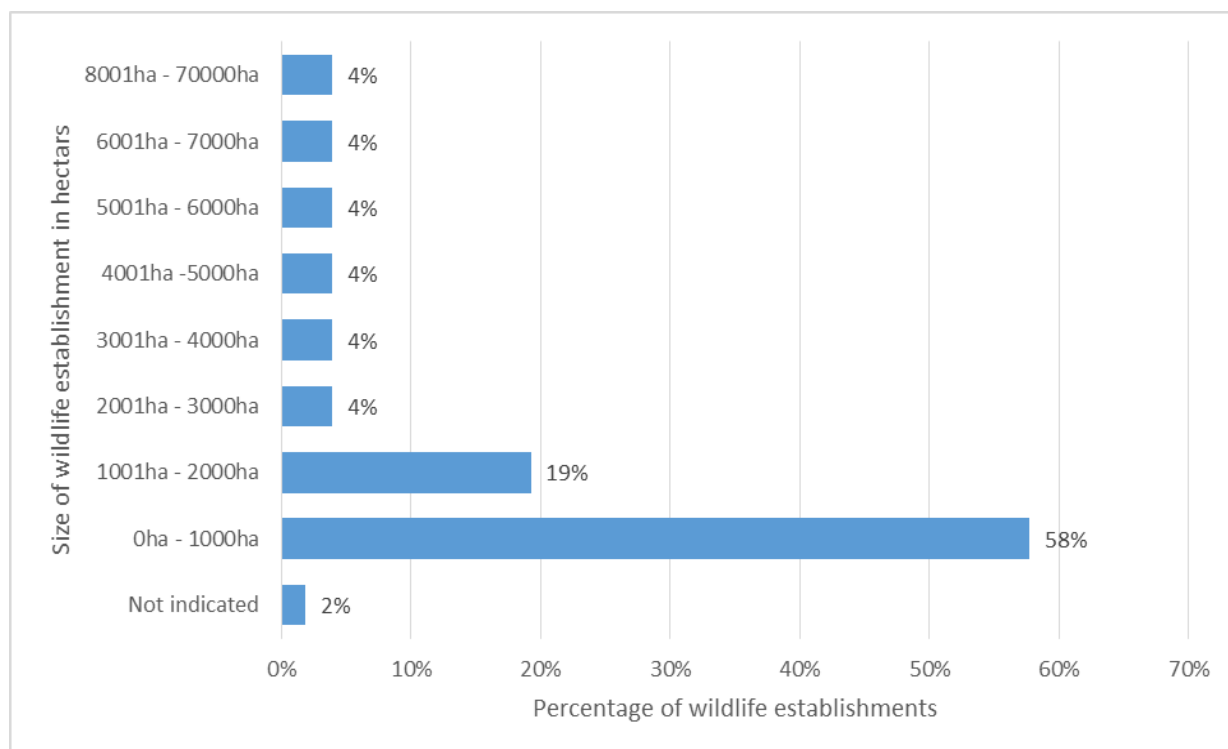


Figure 5.76: Size of wildlife establishments in the North West province

The average size of all private wildlife establishments in the North West province is 1 827ha. The largest percentage of private wildlife establishments (56%) are less than 1 000ha. This was indicated by interviewees 66, 75, 85, 88, 141, 196, 197, 198, 203, 208, 210, 212, 214 and 216. This is followed by 19% of private wildlife establishments that are between 1 001 and 2 000ha. The rest are 4% or less.

- **Species information**

Questions 5 and 6 of the research instrument aimed to determine species owned on the wildlife establishments from the of the North West province whose owners were interviewed. Table 5.21 shows this information.

Table 5.21: Species on the North West province private wildlife establishments

	Crocodile	Duiker (red)	Elephant	Hippopotamus	Sharpe's grysbok	Suni	Duiker (blue)	Grey rhebok	Klipspringer	Lion	Rhino (white)	Black wildebeest	Reedbuck
Number of interviewees	1	1	1	1	1	1	2	2	2	2	2	3	3
Percentage of interviewees	4%	4%	4%	4%	4%	4%	8%	8%	8%	8%	8%	12%	12%
	Tsessebe	Aardvark	Reedbuck mountain	Sable	Bush pig	Roan	Leopard	Buffalo	Bushbuck	Gemsbok	Giraffe	Red hartebeest	
Number of interviewees	3	5	5	6	7	7	8	10	10	10	11	11	
Percentage of interviewees	12%	19%	19%	23%	27%	27%	31%	38%	38%	38%	42%	42%	
	Eland	Ostrich	Steenbok	Zebra (Burchell's)	Springbok	Waterbuck	Duiker (common)	Blesbok	Blue wildebeest	Impala	Kudu	Nyala	
Number of interviewees	12	12	12	12	13	14	15	20	21	22	23	24	
Percentage of interviewees	46%	46%	46%	46%	50%	54%	58%	77%	81%	85%	88%	92%	

Twenty-four interviewees (92%) own nyala and twenty-three interviewees (88%) own kudu. This is followed by 22 interviewees (85%) that own impala, 21 interviewees (81%) that own blue wildebeest and 20 interviewees (77%) own blesbok. In addition, 15 interviewees (58%) own common duiker, 14 interviewees (54%) own waterbuck and 13 interviewees (50%) own springbok. Lastly, 12 interviewees (46%) own eland, ostrich, steenbok and Burchell's zebra. The remaining species are owned by less than 40% of interviewees from the North West province.

- **Years operational**

Question 7 of the research instrument aimed to determine the years that the private wildlife establishments from the North West province have been operational. Twenty-six interviewees gave responses to this question. Figure 77 analyses this information.

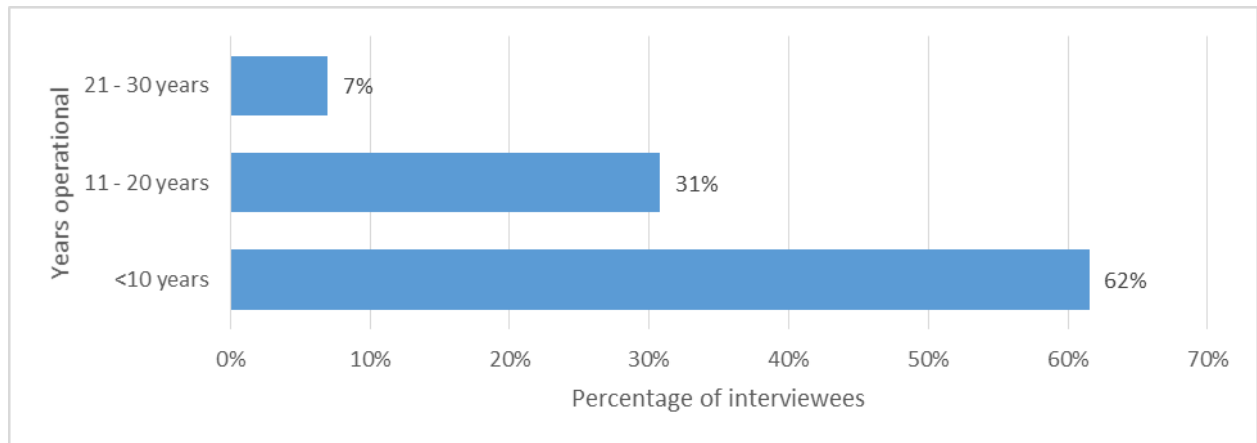


Figure 5.77: Years of operation in the North West province

On average, the private wildlife establishment owners interviewed in North West have been operating for 11 years. The largest percentage of private wildlife establishments (62%) have been operating for less than ten years. This was indicated by interviewees 66, 75, 88, 103, 141, 196, 197, 198, 201, 203, 208, 212 and 216. This is followed by 31% of interviewees that have been operating for between eleven and twenty years and 7% between twenty and thirty years.

5.5.7.2 Land-use in the North West province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners that were interviewed from the in North West province. Twenty-six interviewees gave responses to this question. Table 5.22 summarises this information.

Table 5.22: Breeding practices on the North West province's private wildlife establishments

	Total high Value	Total plains game	High value			Plains game		
			Controlled environments	Semi-extensive	Extensive	Controlled environments	Semi-extensive	Extensive
Number of interviewees	20	25	15	2	7	11	3	13
Average percent breeding	38%	59%	26%	3%	10%	24%	8%	24%

- ***High value species-breeding***

Twenty interviewees from the North West province allocate an average of 38% of breeding to high value game. The interviewees also indicated that, on average, 26% involve breeding high value game in a controlled environment, 10% in an extensive environment and 3% in a semi-extensive environment.

- ***Plains game-breeding***

Twenty-five interviewees from the North West province allocate an average of 59% of breeding to plains game. The interviewees also indicated that, on average, 24% involve breeding plains game in an extensive and controlled environment and 8% in a semi-extensive environment.

North West province interviewees indicated that plains game is mostly bred in both controlled and extensive environments.

- **Land-use and production output**

Question 10 of the research instrument determines the average production output of the private wildlife establishment owners that were interviewed from the in the North West province. Twenty-two interviewees gave responses to this question. Figure 5.78 summarises the information that pertains to the North West province.

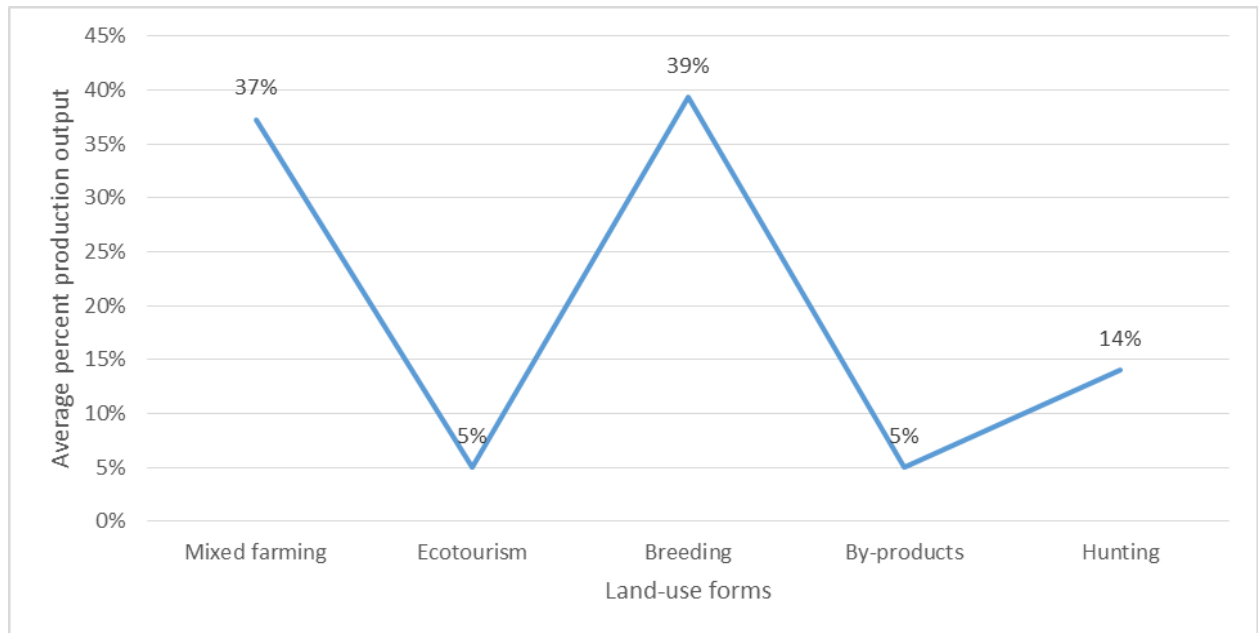


Figure 5.78: Average production output in the North West province

On average, the largest percentage of production output stems from breeding (39%) and mixed farming (37%). The interviewees that indicated that production output stems from mixed farming are numbers 85, 179, 201, 203, 204, 206, 207, 210, 212, 214, 217 and 221 whilst the interviewees that indicated that production output that stems from breeding are 75, 85, 88, 112, 141, 179, 194, 196, 197, 203, 204 and 221.

To a lesser extent, production output is received from ecotourism and by-products (5%) and hunting (14%). The difference between the average percentage mixed farming and breeding is much higher than for the other pillar. Thus the main focus is on these two land-uses.

- **Capital income generated from land-use forms**

Question 12 of the research instrument determined the average income generated from the private wildlife establishments from the North West province whose owners were interviewed. Twenty-four interviewees gave responses to this question. Figure 5.79 summarises this information.

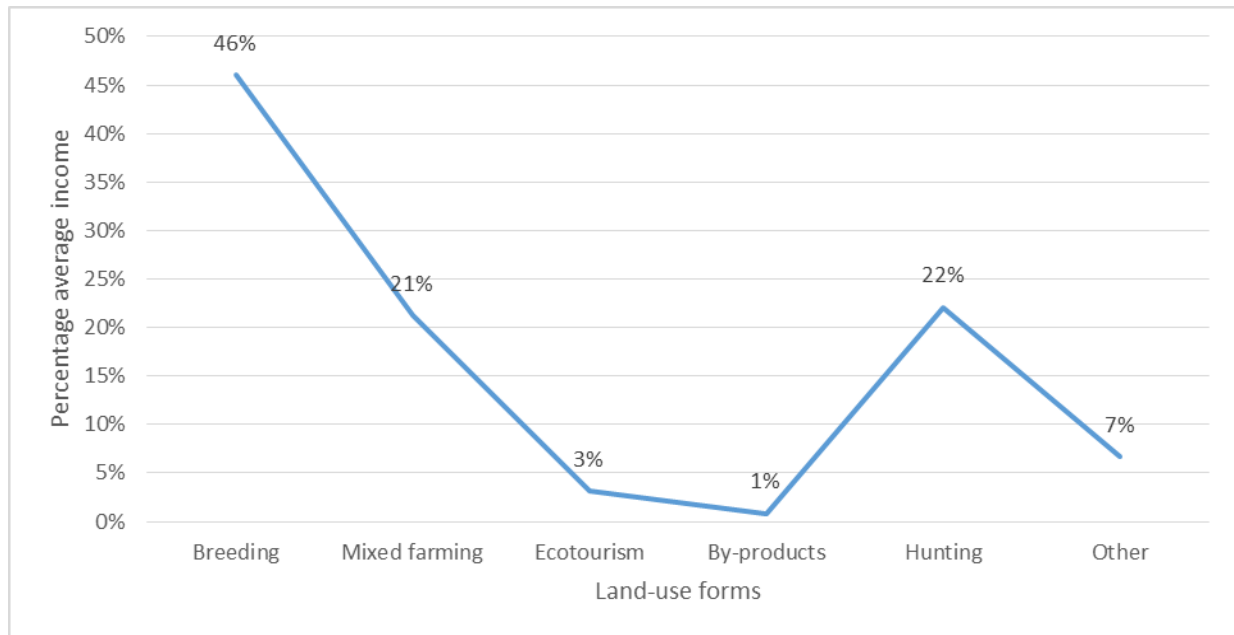


Figure 5.79: Average income generated in the North West province

On average, the largest percentage of income is generated from breeding (46%) which was indicated by interviewee numbers 75, 85, 88, 103, 112, 141, 152, 175, 179, 194, 197, 203, 204, 206, 208 and 216. This was followed by hunting (22%) and mixed farming (21%). To a lesser extent, income is generated from other land-uses (7%), ecotourism (3%) and by-products (1%). Other land-use forms, indicated by interviewees 197, 201 and 206, from which income is generated is feed, hens that do not form part of stock farming, stakeholders and personnel.

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determined the average expenditure based on capital layout of the private wildlife establishment owners that were interviewed from the North West province. Twenty-two interviewees gave responses to this question. Figure 5.80 summarises this information.

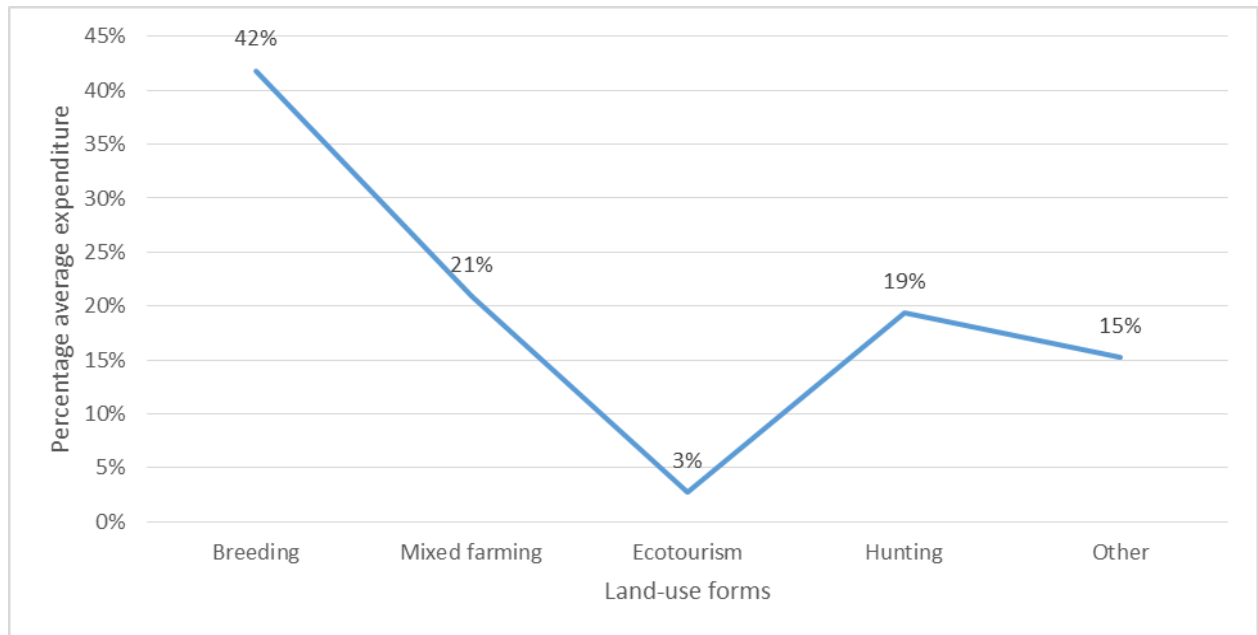


Figure 5.80: Average expenditure based on capital layout in the North West province

On average, the largest percentage of average expenditure based on capital layout stems from breeding (42%) indicated by interviewees 75, 85, 88, 103, 113, 141, 179, 194, 196, 197, 206, 208, 216 and 221. This was followed by mixed farming (21%) and hunting (19%). To a lesser extent, expenditure based on capital layout stems from other land-uses (15%) and ecotourism (3%). Other land-use forms refers to vets, feed and diesel and was indicated by interviewees 152, 175, 196, 197 and 206.

5.5.7.3 Capital spent on land, animals and infrastructure in the North West province

Question 14 of the research instrument determined the capital spent on land, animals and infrastructure on the private wildlife establishments from the North West province whose owners were interviewed. Figures 5.81, 5.82 and 5.83 summarise this information.

- ***Capital spent on land***

The information in Figure 5.81 summarises the capital spent on land in the North West province. Twenty-four interviewees gave responses to this question.

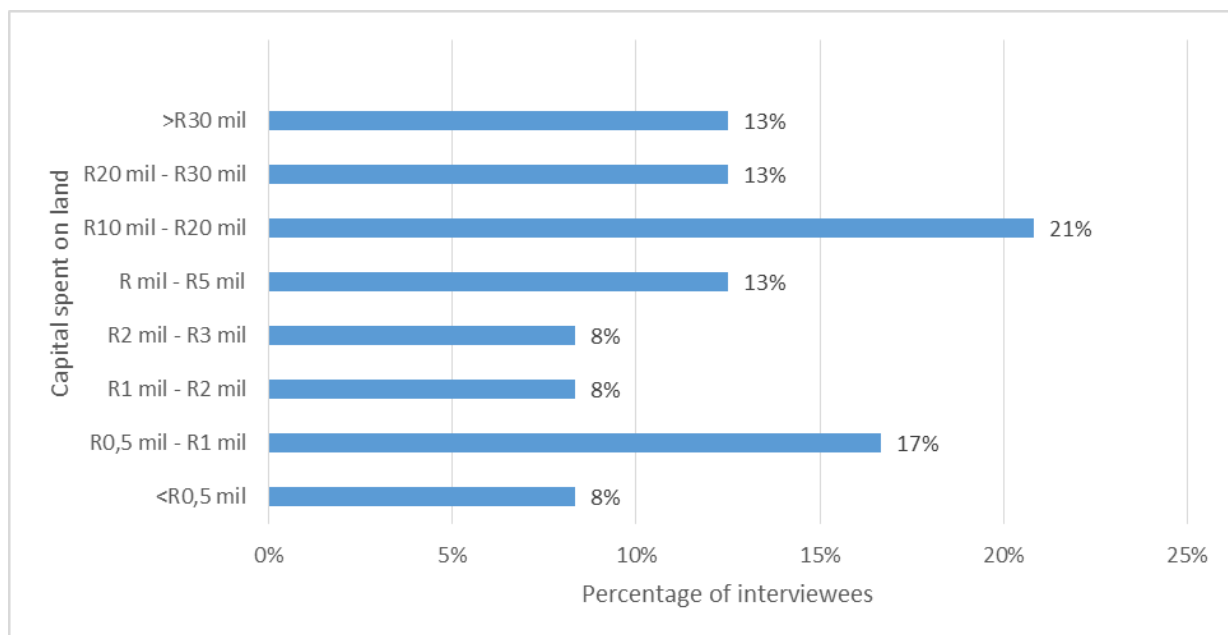


Figure 5.81: Capital spent on land in the North West province

In total, 21% of interviewees spent between R10 and R20 million of capital on land. The interviewee numbers are 85, 112, 175, 197 and 212. This is followed by 17% of interviewees that spent between R500 000 to R1 million of capital on land and the same percentage of interviewees (13%) spent between R3 million and R5 million, between R20 million and R30 million and more than R30 million of capital on land. The rest are less than 10%.

- ***Capital spent on animals***

The information in Figure 5.82 summarises the capital spent on animals in the North West province. Twenty-four interviewees gave responses to this question.

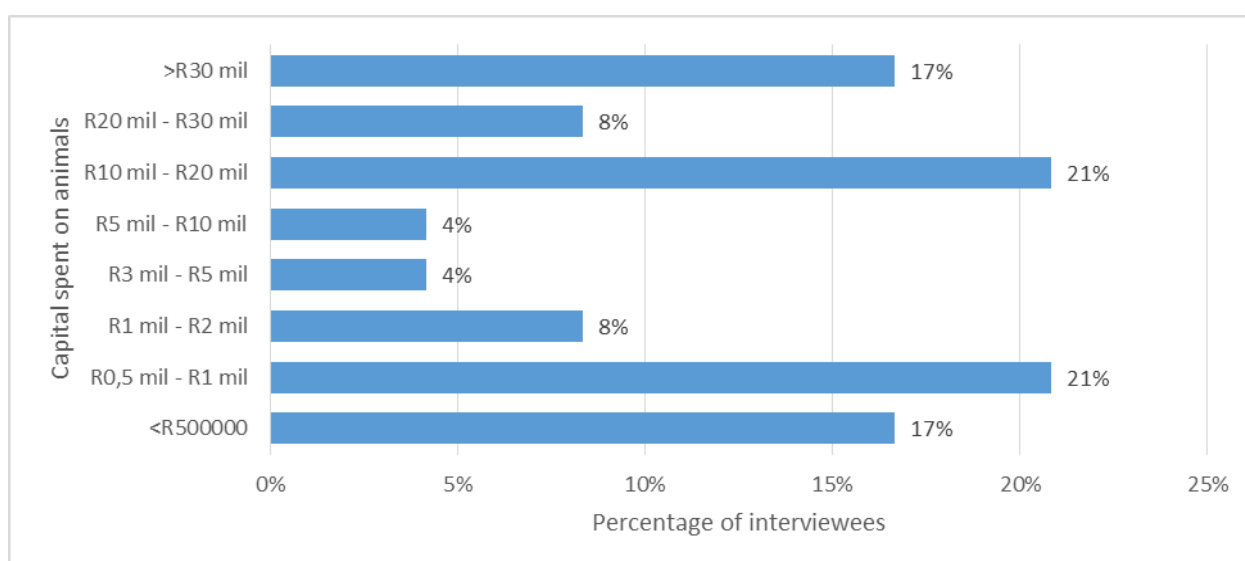


Figure 5.82: Capital spent on animals in the North West province

In total, 21% of interviewees (66, 88, 196, 214 and 217) spent between R500 000 and R1 million of capital on animals and the same percentage of interviewees (85, 175, 197, 201, 204) between R10 and R20 million of capital on animals. This is followed by 17% of interviewees that spent either less than R500 000 or more than R30 million of capital on animals. The rest are below 10%.

- **Capital spent on infrastructure**

The information in Figure 5.83 summarises the capital spent on infrastructure in the North West province. Twenty-one interviewees gave responses to this question.

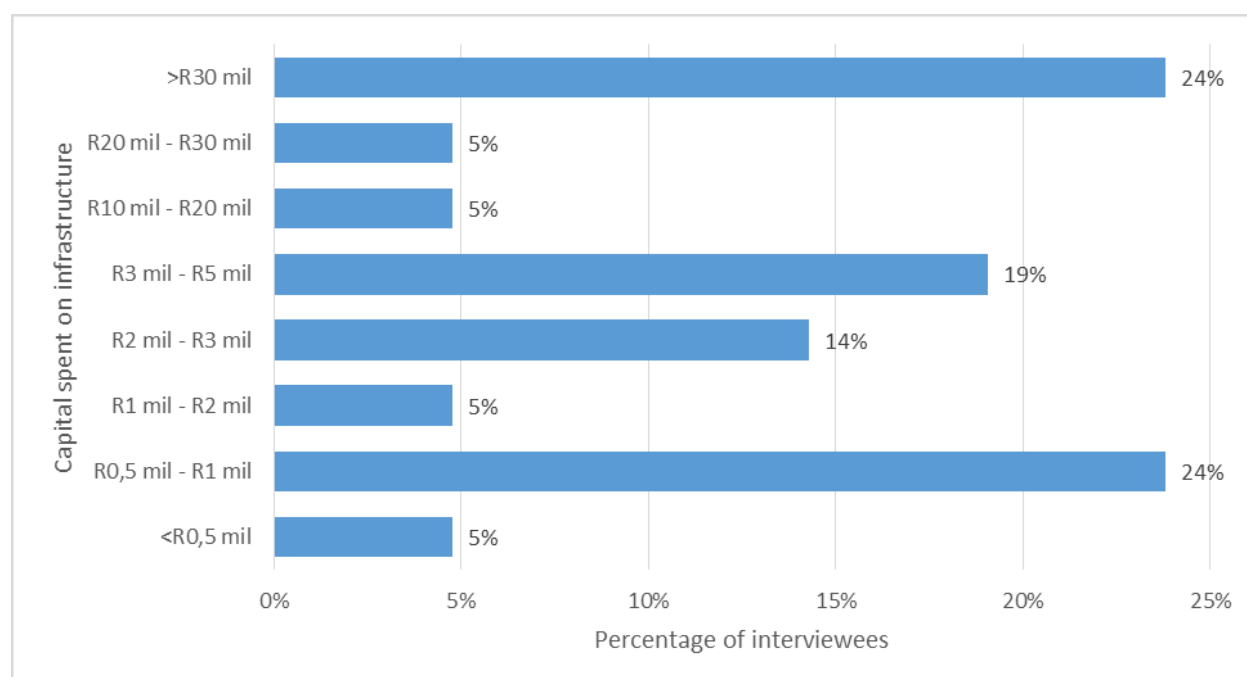


Figure 5.83: Capital spent on infrastructure in the North West province

The largest percentage of interviewees (24%) spent between R500 000 and R1 million (interviewees 88, 198, 207 and 217) and the same percentage of interviewees spent more than R30 million of capital on infrastructure (interviewees 103, 112, 152, 179 and 201). This is followed by 19% of interviewees that spent between R3 and R5 million of capital on infrastructure and 14% of interviewees that spent between R2 and R3 million of capital on infrastructure. The rest are below 10%.

5.5.8 KwaZulu-Natal province

The information below pertains to data collected from seven private wildlife establishments located in the KwaZulu-Natal province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.8.1 Demographic information of private wildlife establishments in the KwaZulu-Natal province

- **Size of wildlife establishments**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishments from the KwaZulu-Natal province whose owners were interviewed. Seven interviewees gave responses to this question. Figure 5.84 shows this information

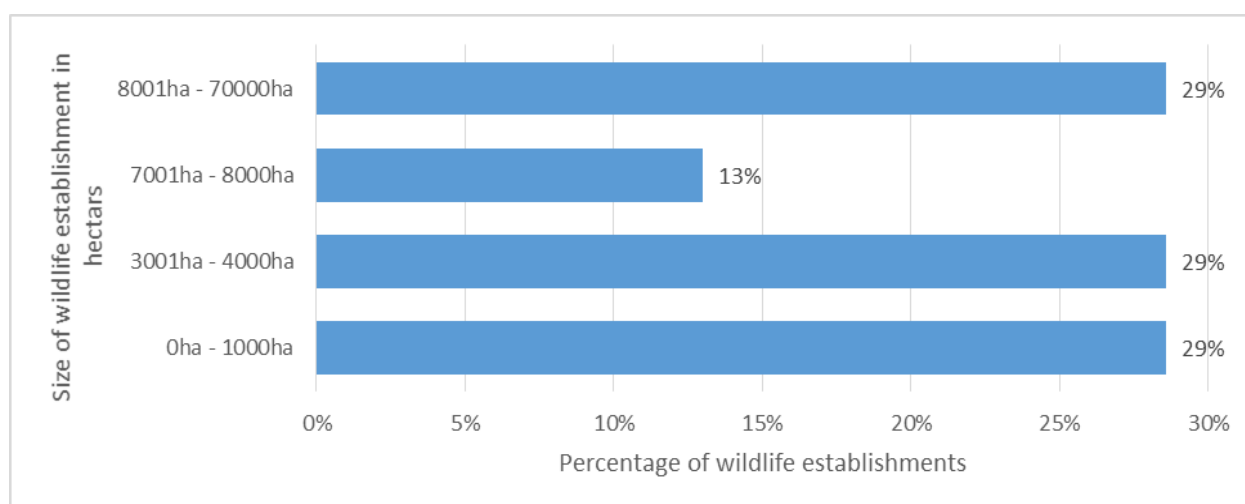


Figure 5.84: Size of wildlife establishments

The average size of all private wildlife establishments in the KwaZulu-Natal province is 7 122ha which is larger than any other province with the exception of the Northern Cape. If the private wildlife establishment with the largest land size (10 000ha) is removed, the average drops to 4 310ha. In total, 29% of the private wildlife establishments are less than a 1 000ha (interviewees 95 and 173). The same percentage of interviewees (29%) have private wildlife establishments that are between 3 001 and 4 000ha (interviewee 83 and 93) as well as between 8 001 and 70 000ha (interviewee 6 and 90) respectively. The minority (13%) is between 7 001 and 8 000ha.

- **Species information**

Question 5 and 6 of the research instrument aimed to determine species owned on the wildlife establishment owners that were interviewed from the KwaZulu-Natal province. Table 5.23 show the information as it pertains to the KwaZulu-Natal province.

Table 5.23: Species on the KwaZulu-Natal province's private wildlife establishments

	Black wildebeest	Gemsbok	Sharpe's grysbok	Oribi	Roan	Sable	Tsessebe	Duiker (blue)	Eland	Grey rhebok	Klipspringer	Reedbuck	Reedbuck mountain
Number of respondents	1	1	1	1	1	1	1	2	2	2	2	2	2
Percentage of respondents	14%	14%	14%	14%	14%	14%	14%	29%	29%	29%	29%	29%	29%
	Red hartebeest	Blesbok	Ostrich	Rhino (black)	Rhino (white)	Suni	Suni	Crocodile	Elephant	Lion	Duiker (common)	Hippopotamus	Steenbok
Number of respondents	2	3	3	3	3	3	3	4	4	4	5	5	5
Percentage of respondents	29%	43%	43%	43%	43%	43%	43%	57%	57%	57%	71%	71%	71%
	Buffalo	Bushbuck	Duiker (red)	Impala	Waterbuck	Zebra (Burchells)	Aardvark	Blue wildebeest	Bush pig	Giraffe	Kudu	Leopard	Nyala
Number of respondents	6	6	6	6	6	6	7	7	7	7	7	7	7
Percentage of respondents	86%	86%	86%	86%	86%	86%	100%	100%	100%	100%	100%	100%	100%

Seven interviewees (100%) own aardvark, blue wildebeest, bush pig, giraffe, kudu, leopard and nyala respectively. Six interviewees (86%) own buffalo, bushbuck, red duiker, impala, waterbuck and Burchell's zebra respectively. Five interviewees (71%) own common duiker, hippopotamus and steenbok whilst four respondents (57%) own crocodile, suni, elephant and lion. The remainder of the species are all owned by less than 50% of interviewees from KwaZulu-Natal.

- **Years operational**

Question 7 of the research instrument aimed to determine the years the private wildlife establishments in the KwaZulu-Natal province have been operational. Seven interviewees gave responses to this question. Figure 5.85 analyses this information.

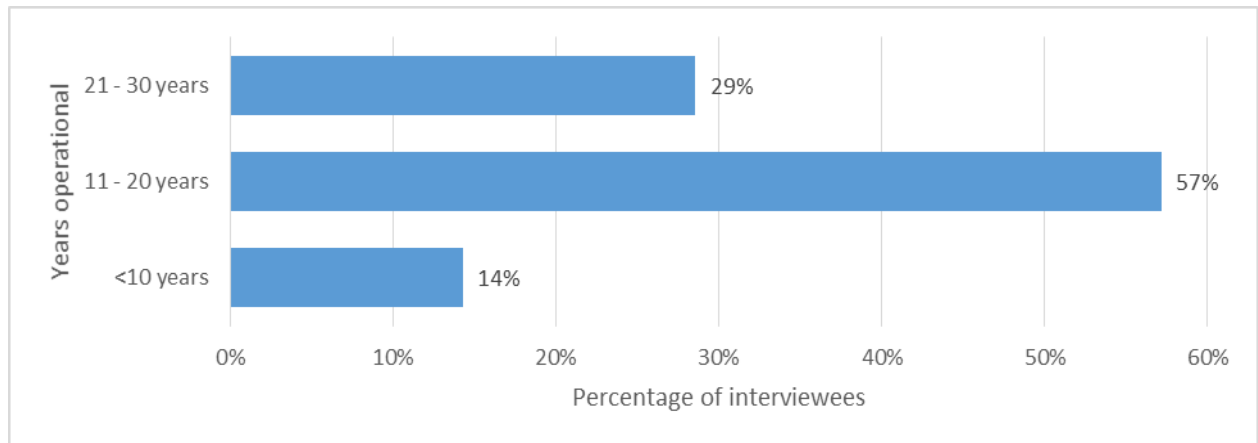


Figure 5.85: Years of operation

On average, the private wildlife establishment owners interviewed have been operating for 18 years. Interviewees 83, 90, 93 and 173 (57%) have been in operation for between 11 and 20 years. This is followed by 29% of interviewees (number 6 and 94) that have been operating between 21 and 30 years and 14% that have been operating for less than 10 years (interviewee number 95).

5.5.8.2 Land-use in the KwaZulu-Natal province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishment owners that were interviewed from the KwaZulu-Natal province. Seven interviewees gave responses to this question. Table 5.24 summarises this information.

Table 5.24: Breeding practices on the Free State province's private wildlife establishments

	Total high value	Total plains game	High value		Plains game	
			Controlled environments	Extensive	Semi-extensive	Extensive
Number of interviewees	3	7	2	2	1	6
Average percent of breeding	20%	80%	8%	12%	9%	71%

- ***High value species-breeding***

Three interviewees allocate an average of 20% of breeding to high value game. The interviewees also indicated that, on average, 12% involves breeding high value game in an extensive environment whilst 8% breed high value game in a controlled environment.

- ***Plains game-breeding***

Seven interviewees allocate an average of 80% of breeding to plains game. The interviewees also indicated that, on average, 71% involve breeding high value game in an extensive environment whilst 9% breed plains game in a semi-extensive environment.

Overall, plains game is mostly bred in extensive environments.

- **Land-use and production output**

Question 10 of the research instrument determined the average production output of the private wildlife establishment owners that were interviewed from the KwaZulu-Natal province. Seven interviewees gave responses to this question. Figure 5.86 summarises this information.

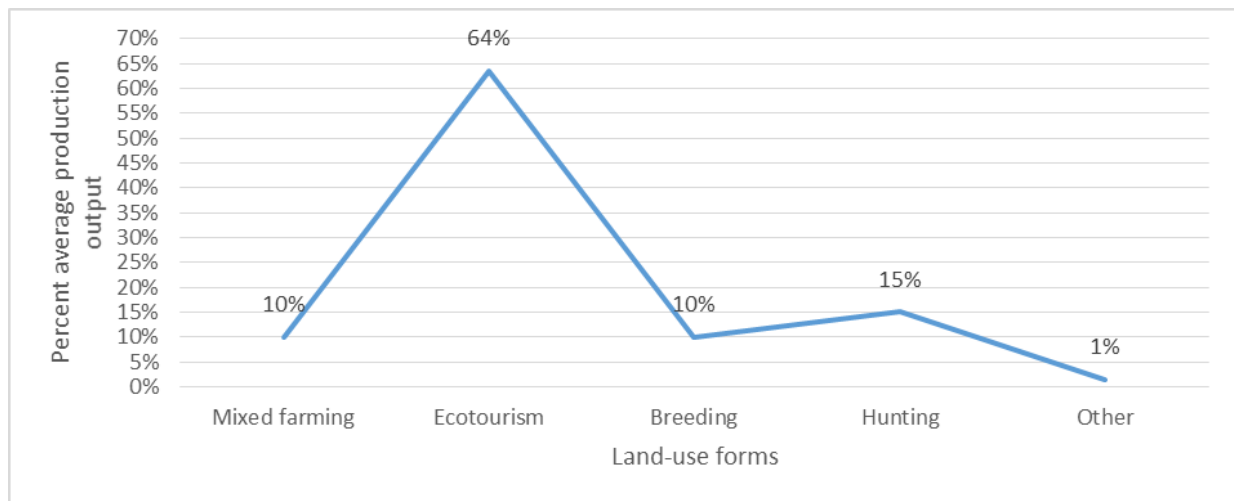


Figure 5.86: Average production output in the KwaZulu-Natal province

On average, the largest percentage of production output stems from ecotourism (64%). The production output for ecotourism in the KwaZulu-Natal province is higher than in other provinces. Ecotourism, as opposed to breeding, hunting and mixed farming in other provinces, are an important consideration for all private wildlife establishment owners interviewed in the KwaZulu-Natal province with the exception of interviewee number 93. This is different from all other provinces where ecotourism's production output is amongst the lowest of all land-use forms. To a lesser extent, production output stems from hunting (15%), mixed farming and breeding (10%) and other land-use forms (1%). Other land-use forms include an abattoir and was indicated by interviewee 90.

- **Capital income generated from land-use forms**

Question 12 determined the average income generated from the private wildlife establishment owners that were interviewed from the KwaZulu-Natal province. Seven interviewees gave responses to this question. Figure 5.87 summarises this information

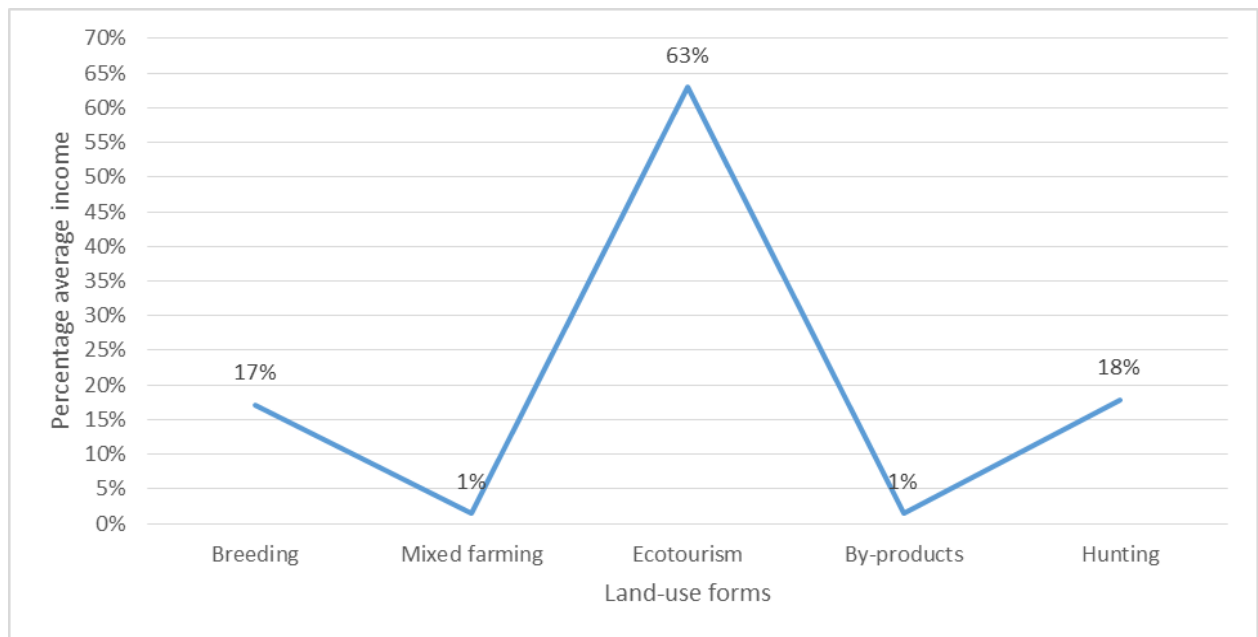


Figure 5.87: Average income generated in the KwaZulu-Natal province

On average, the largest average percentage income generated is from ecotourism (62%) from all interviewees from the KwaZulu-Natal province, except for interviewee 93. This is different from other provinces where ecotourism generates some of the lowest average income. To a lesser extent, income is generated from breeding (17%), hunting (18%) and by-products and mixed farming (1%).

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determined the average expenditure based on capital layout of the private wildlife establishments from the KwaZulu-Natal province whose owners were interviewed. Five interviewees gave responses to this question. Figure 5.88 summarises this information.

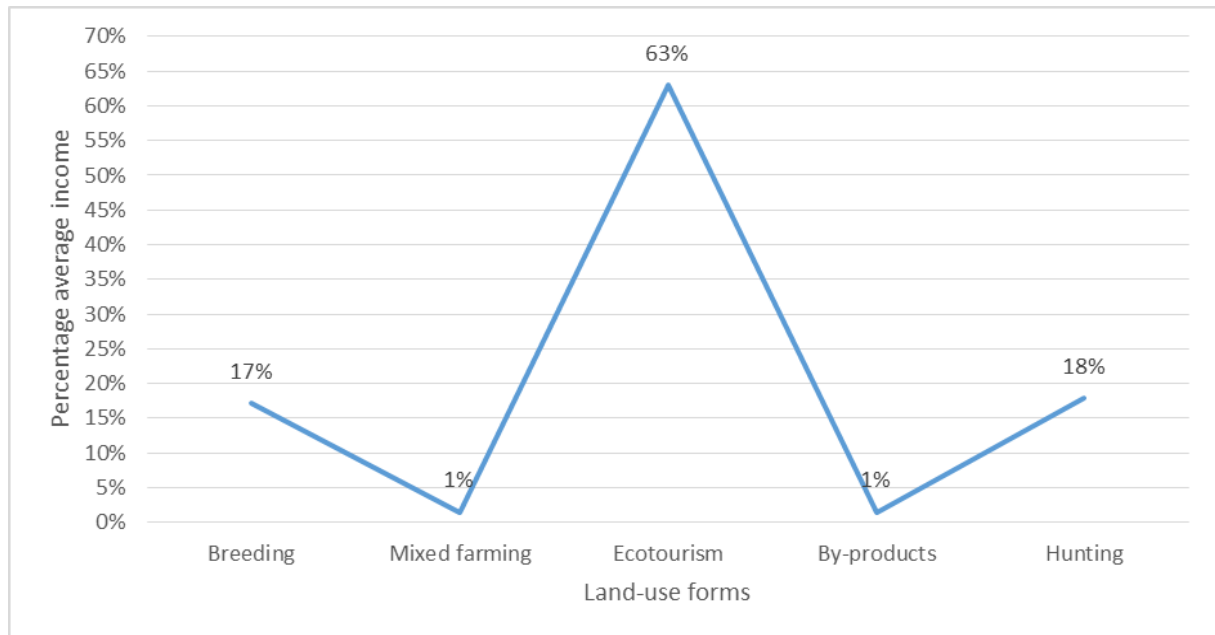


Figure 5.88: Average expenditure based on capital layout in the KwaZulu-Natal province

On average, the largest percentage of average expenditure based on capital layout stems from ecotourism (63%) from interviewees 6, 83, 94 and 173. This is different to other provinces where expenditure from capital layout from ecotourism are low. To a lesser extent, the average expenditures based on capital layout from other pillars stem from breeding (24%), hunting (9%), mixed farming (3%) and by-products (1%).

Considering the production output, income generated and expenditure based on capital layout, it is clear that ecotourism in the KwaZulu-Natal province is of great importance.

5.5.8.3 Capital spent on land, animals and infrastructure in the KwaZulu-Natal province

Question 14 of the research instrument determined the capital spent on land, animals and infrastructure on private wildlife establishments in the KwaZulu-Natal province. Figures 5.89, 5.90 and 5.91 summarise this information.

- ***Capital spent on land***

The information in Figure 5.89 summarises the capital spent on land in the KwaZulu-Natal province. Three interviewees gave responses to this question.

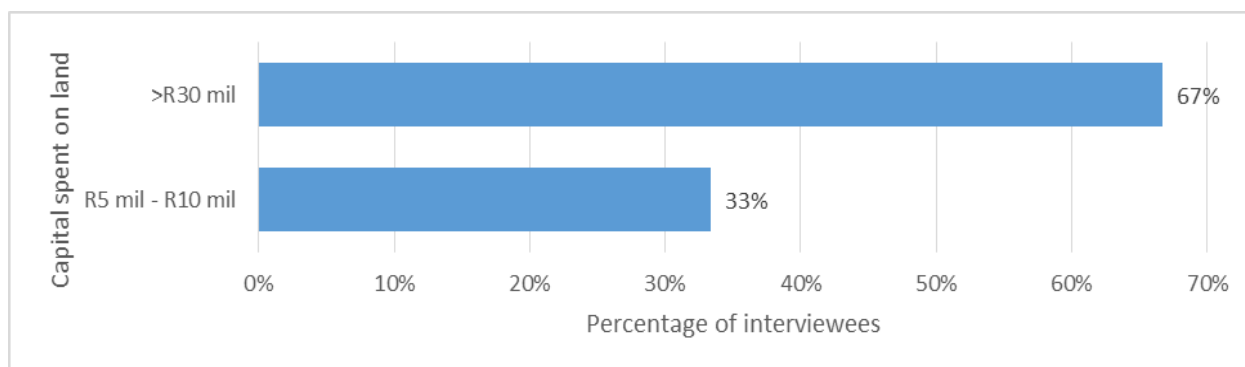


Figure 5.89: Capital spent on land in the KwaZulu-Natal province

Interviewees 90 and 94 (67%) spent more than R30 million of capital on land whilst interviewee 95 (33%) spent between R5 and R10 million of capital on land.

- ***Capital spent on animals***

The information in Figure 5.90 summarises the capital spent on animals in the KwaZulu-Natal province.

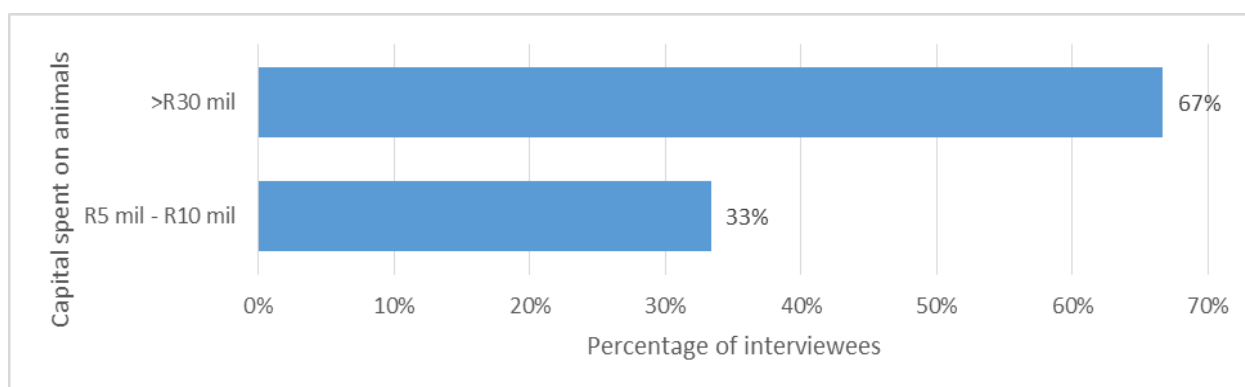


Figure 5.90: Capital spent on animals in the KwaZulu-Natal province

Interviewees 90 and 94 (67%) spent more than R30 million of capital on animals whilst interviewee 95 (33%) spent between R5 and R10 million of capital on animals.

- ***Capital spent on infrastructure***

The information in Figure 5.91 summarises the capital spent on infrastructure in the KwaZulu-Natal province. Two interviewees gave responses to this question.

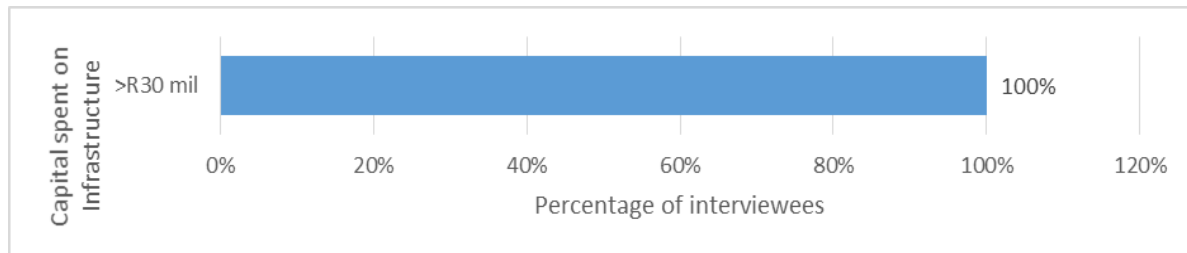


Figure 5.91: Capital spent on infrastructure in the KwaZulu-Natal province

Interviewees 90 and 94 have spent more than R30 million of capital on infrastructure. The different respondents had different land sizes and have been in existence for mostly less than 20 years. Aardvark, blue wildebeest, bush pig, giraffe, kudu, leopard and nyala are the most popular species kept. The main difference between the KwaZulu-Natal province and the other provinces is that ecotourism has the highest average production output, income generated and expenditure based on capital layout. The capital spent on land, animals and infrastructure is high.

5.5.9 Free State province

The information below pertains to data collected from fifteen private wildlife establishments located in the Free State province. This information relates to the demographic data (size of private wildlife establishments, the species, years operational) as well as land-use (breeding practices, production output, income generated, expenditure based on capital layout) and capital spend (on land, animals and infrastructures).

5.5.9.1 Demographic information of private wildlife establishments in the Free State province

- **Size of wildlife establishments**

Question 4 of the research instrument aimed to determine the land size of the private wildlife establishment owners that were interviewed from the Free State province. Fifteen interviewees gave responses to this question. Figure 5.92 summarises this information.

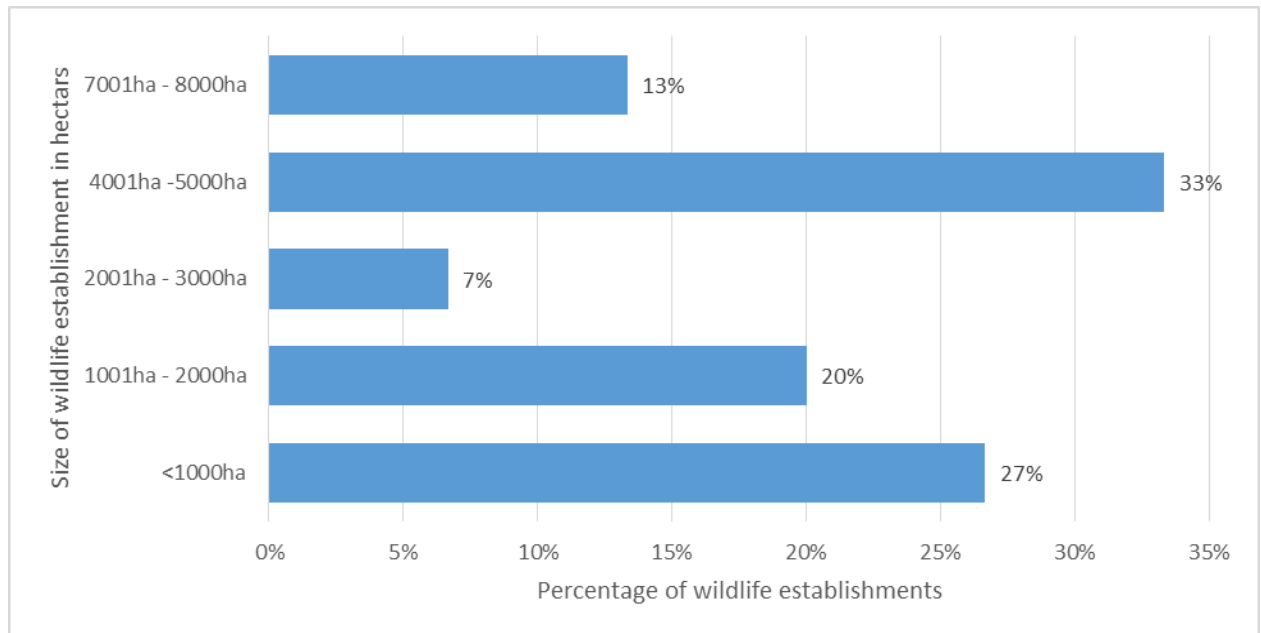


Figure 5.92: Size of wildlife establishments in the Free State province

The average size of all private wildlife establishments in the Free State province is 3 170ha. The largest percentage of private wildlife establishments (33%) are between 4 001 and 5 000ha in size. This was indicated by interviewees 64, 79, 140, 153 and 200. This is followed by 27% of private wildlife establishments being less than 1 000ha and 20% between 1 001 and 2 000ha. Lastly, 13% of private wildlife establishments are between 7 001 and 80 000ha in size and 7% between 1 001 and 3 000ha.

- **Species information**

Questions 5 and 6 of the research instrument aimed to analyse species owned on the private wildlife establishments of the Free State province. Table 5.25 summarises this information.

Table 5.25: Species on Free State private wildlife establishments

	Crocodile	Duiker (blue)	Elephant	Leopard	Hippopotamus	Oribi	Bush Pig	Zebra (mountain)	Bontebok	Lion	Rhino (white)	Bushbuck	Grey rhebuck
Number of interviewees	1	1	1	1	2	2	3	3	4	4	4	5	5
Percentage of interviewees	7%	7%	7%	7%	13%	13%	20%	20%	27%	27%	27%	33%	33%
	Reedbuck mountain	Aardvark	Zebra (Burchell's)	Blue wildebeest	Red hartebeest	Roan	Roan	Steenbok	Black wildebeest	Eland	Giraffe	Lechwe	Tsessebe
Number of interviewees	5	6	6	7	7	7	7	7	8	8	8	8	8
Percentage of interviewees	33%	40%	40%	47%	47%	47%	47%	47%	53%	53%	53%	53%	53%
	Waterbuck	Buffalo	Duiker (common)	Gemsbok	Ostrich	Reedbuck	Kudu	Impala	Sable	Blesbok	Nyala	Springbok	
Number of interviewees	8	9	9	9	9	9	10	11	11	12	12	13	
Percentage of interviewees	53%	60%	60%	60%	60%	60%	67%	73%	73%	80%	80%	87%	

Thirteen interviewees (87%) own springbok whilst 12 interviewees (80%) own blesbok and nyala. This is followed by 11 interviewees (73%) that own impala and sable, 10 interviewees (67%) that own kudu and 9 interviewees (60%) that own buffalo, common duiker, gemsbok, ostrich and reedbuck. Eight interviewees (53%) own black wildebeest, eland, giraffe, lechwe, tsessebe and waterbuck. The remaining species are owned by less than 50% of respondents from the Free State province.

- **Years operational**

Question 7 of the research instrument aimed to determine the years the private wildlife establishment of the Free State province have been operational. Fifteen interviewees gave responses to this question. Figure 5.93 analyses this information.

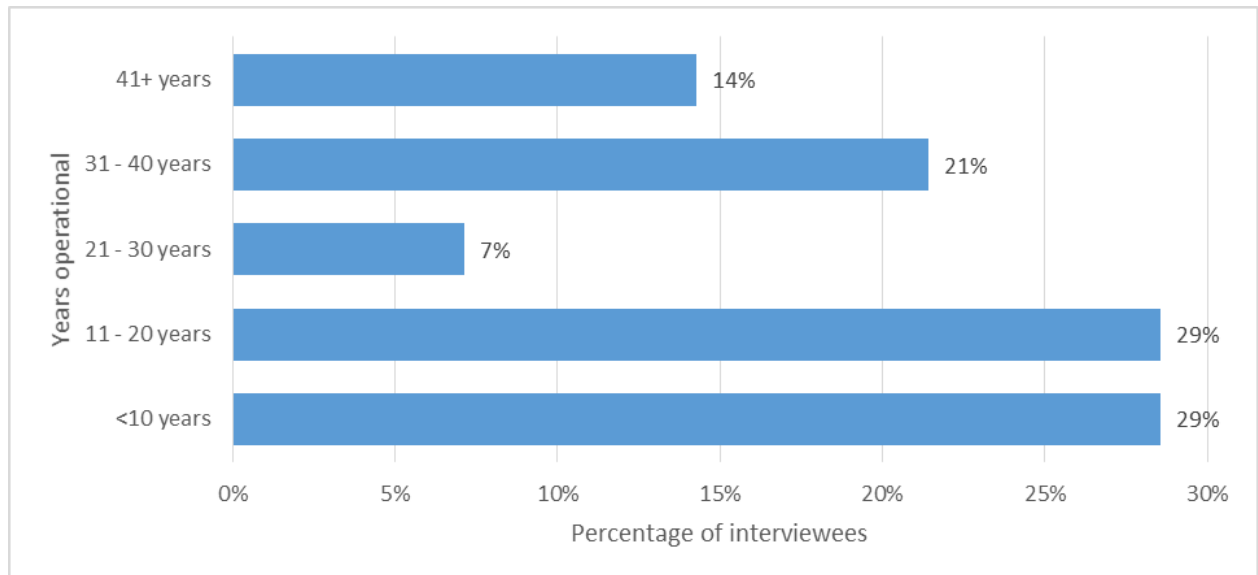


Figure 5.93: Years of operation in the Free State province

On average, the private wildlife establishments have been operating for 26 years. The private wildlife establishment that has been operating for the longest time has been operating for 100 years. This is followed by a private wildlife establishment that has been operating for 50 years. The average number of years is reduced to 20 if the one interviewees' private wildlife establishment, which has been operating for 100 years, is removed from the calculation. In total, 29% of interviewees have been operational for less than 10 years (74, 107, 55 and 86) or between 11 and 20 years (1, 157, 1440, 163, and 109) respectively. This is followed by 21% of interviewees that have been operational for between 31 and 40 years, 14% that has been operational for more than 41 years and 7% that has been in operation for 21 to 30 years.

5.5.9.2 Land-use in the Free State province

- **Breeding of game species**

Question 9 of the research instrument aimed to determine the breeding practices of the private wildlife establishments from the Free State province whose owners that were interviewed. Fifteen interviewees gave responses to this question. Table 5.26 summarises this information.

Table 5.26: Breeding practices on the Free State province's private wildlife establishments

	Total high value	Total plains game	High value			Plains game		
			Controlled environments	Semi-extensive	Extensive	Controlled environments	Semi-extensive	Extensive
Number of interviewees	14	9	10	2	4	2	4	5
Average percent of breeding	60%	40%	37%	3%	17%	6%	12%	13%

○ ***High value species-breeding***

Fourteen interviewees allocate an average of 60% of breeding to high value game. The interviewees also indicated that, on average, 37% involve breeding high value game in a controlled environment whilst 17% breed high value game in an extensive environment and 3% in a semi-extensive environment.

Overall high value breeding is applied most in controlled environments

○ ***Plains game-breeding***

Nine interviewees allocate an average of 40% of breeding to plains game. The interviewees also indicated that, on average, 13% involve breeding plains game in an extensive environment whilst 12% breed high value game in a semi-extensive environment and 6% in an extensive environment.

• **Land-use and production output**

Question 10 of the research instrument determined the average production output of the private wildlife establishments in the Free State province. Eight interviewees gave responses to this question. Figure 5.94 summarises this information.

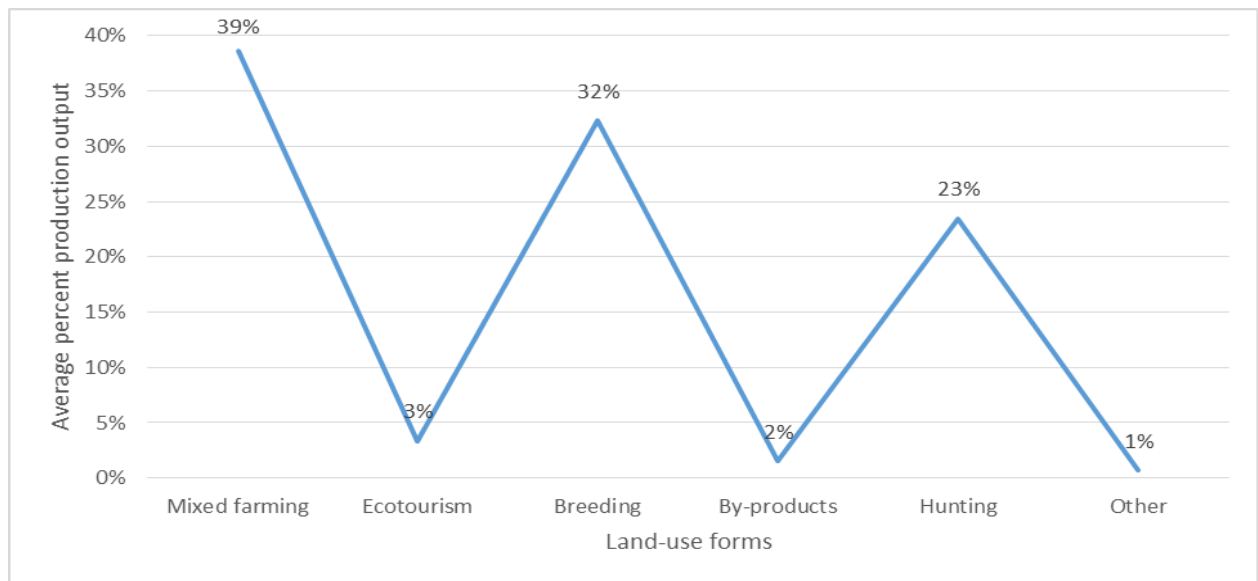


Figure 5.94: Average production output in the Free State province

On average, the largest percentage of production output stems from mixed farming (33%) by interviewees 153, 200 and 215. This is followed by-products (32%) and hunting (21%). To a lesser extent, production output from other pillars include ecotourism (3%), by-products (2%) and other land-use forms from one interviewee (9%). Interviewee 82 did not indicate what the 'other' land-uses entailed.

- **Capital income generated from land-use forms**

Question 12 of the research instrument determined the average income generated from the private wildlife establishments in the Free State province. Fourteen interviewees gave responses to this question. Figure 5.95 summarises this information.

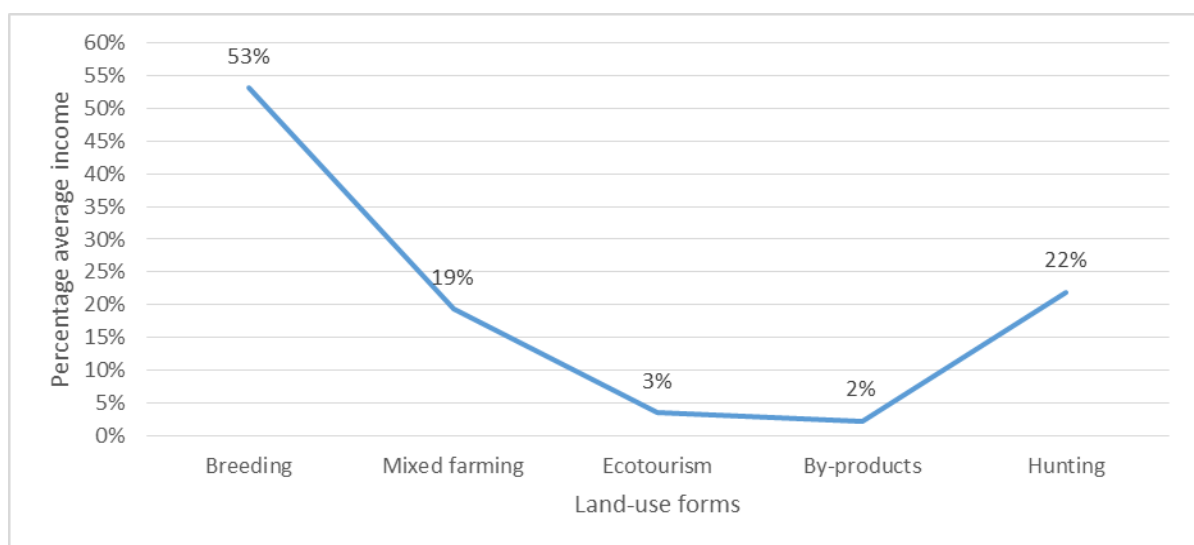


Figure 5.95: Average income generated in the Free State province

On average, the largest percentage of average income (53%) stems from breeding which was indicated by interviewees 1, 55, 6, 7, 79, 82, 109, 109, 140, 153, 157 and 163. Income is also generated from hunting (22%), mixed farming (19%), ecotourism (3%) and by-products (2%).

- **Expenditure based on capital layout per land-use form**

Question 16 of the research instrument determined the average expenditure based on capital layout for the private wildlife establishments in the Free State province. Twelve interviewees gave responses to this question. Figure 5.96 summarises this information.

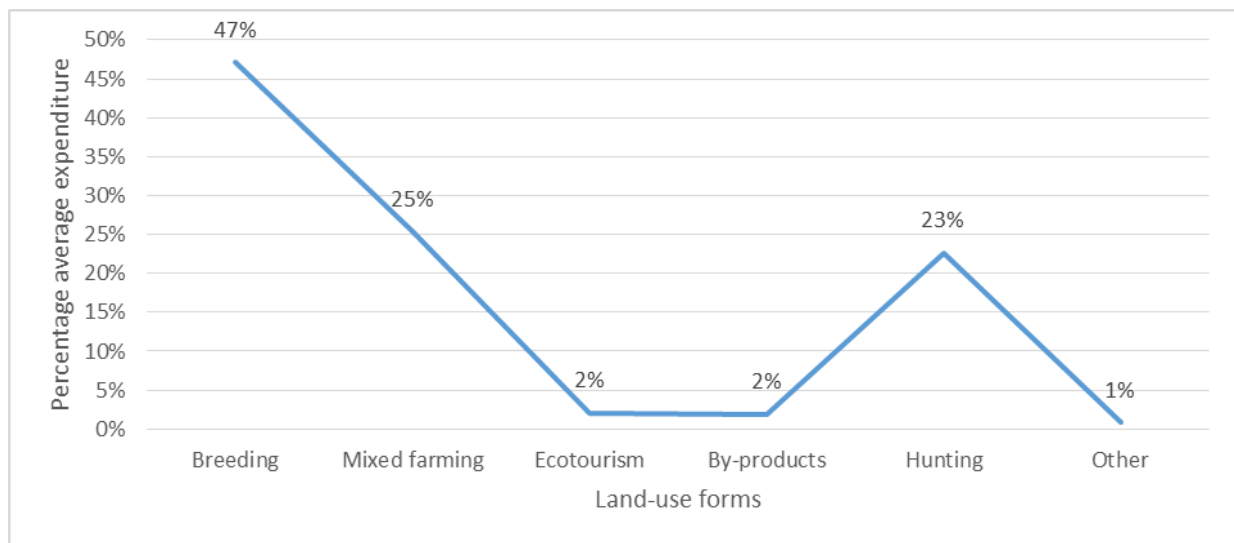


Figure 5.96: Average expenditure based on capital layout in the Free State province

On average, the largest percentage of expenditure based on capital layout stems from breeding (47%) which was indicated by interviewees 1, 55, 64, 74, 79, 82, 107, 109, 153, 163 and 200. This is followed by mixed farming (25%) and hunting (23%). To a lesser extent, ecotourism and by-products (2%) and other land-use forms (1%). Interviewee 82 did not indicate what other land-use forms entailed.

5.5.9.3 Capital spent on land, animals and infrastructure in the Free State province

Question 14 of the research instrument determined the capital spent on land, animals and infrastructure by the private wildlife establishment owners in the Free State province. Figures 5.97, 5.98 and 5.99 summarise this information.

- ***Capital spent on land***

The information in Figure 5.97 summarises the capital spent on land in the Free State province. Twelve interviewees gave responses to this question.

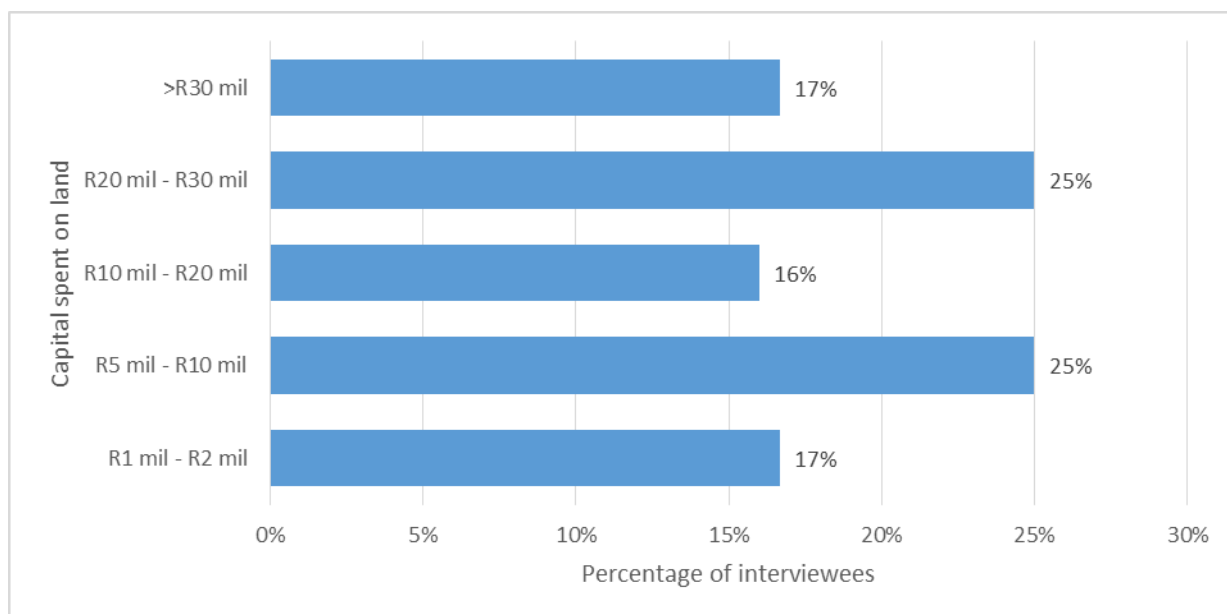


Figure 5.97: Capital spent on land in the Free State province

Interviewees 79, 82 and 200 (25%) have spent between R5 and R10 million of capital on land. Interviewees 79, 82 and 200 (25%) have spent between R20 and R30 million of capital on land. Of the remaining interviewees, 17% spent less than R500 000, 16% between R3 and R5 million and 17% between R10 and R50 million of capital on land respectively.

- ***Capital spent on animals***

The information in Figure 5.98 summarises the capital spent on animals in the Free State province. Thirteen interviewees gave responses to this question.

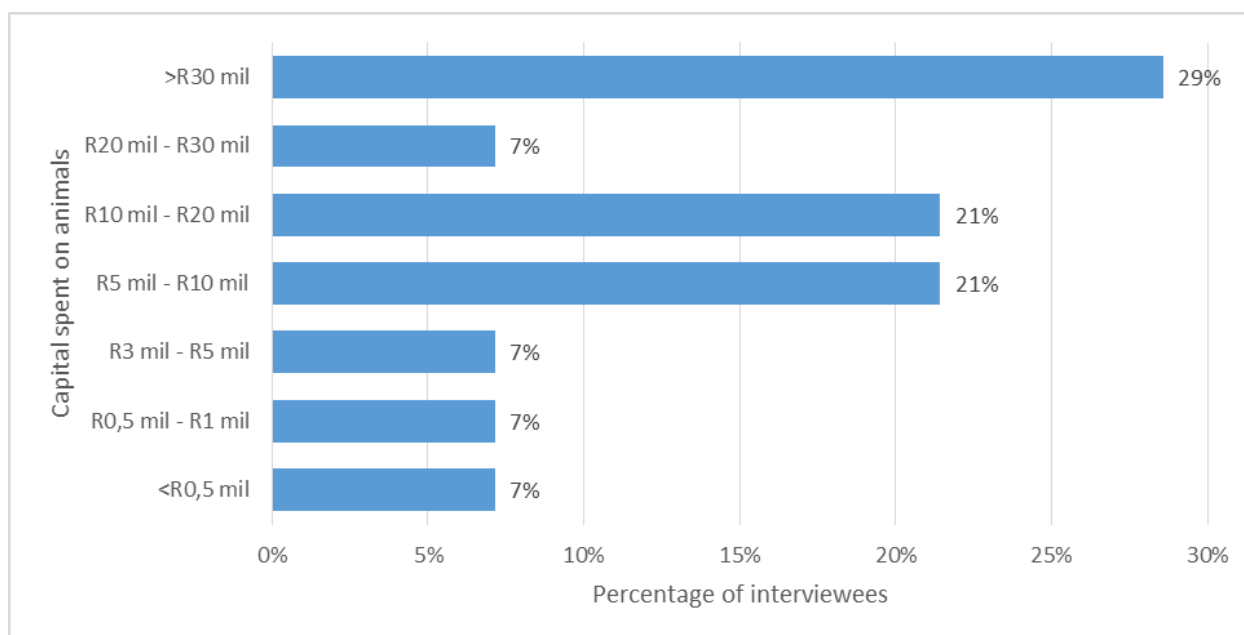


Figure 5.98: Capital spent on animals in the Free State province

Interviewees 1, 109, 140 and 163 (29%) spent more than R30 million on animals. This is followed by 21% of interviewees spending between R5 million and R10 million and the same percentage of interviewees (21%) spend between R10 and R20 million of capital on animals. The rest are below 10%.

- **Capital spent on infrastructure**

The information in Figure 5.99 summarises the capital spent on infrastructure in the Free State province. Twelve interviewees gave responses to this question.

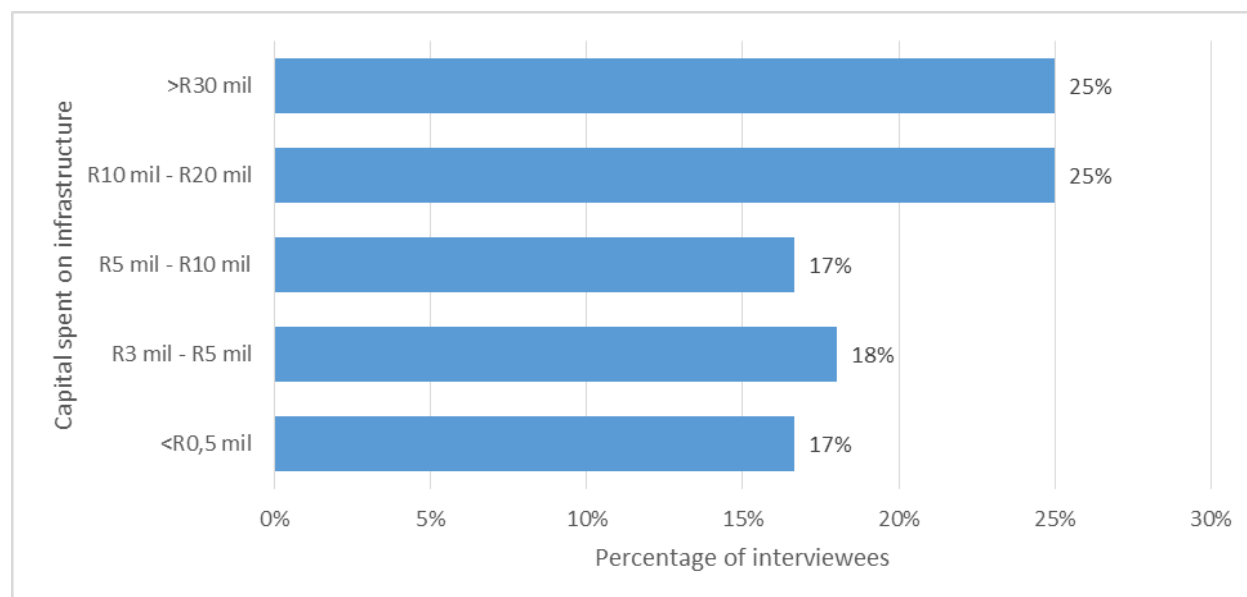


Figure 5.99: Capital spent on infrastructure in the Free State province

Interviewees 1, 153 and 200 (25%) have spent between R10 and R20 million and interviewees 109, 140 and 163 (25%) more than R30 million of capital on infrastructure. Of the remaining interviewees, 17% spent less than R500 000, 18% between R3 million and R5 million and 17% between R5 million and R10 million of capital on infrastructure respectively.

Considering the different provinces' land-use information, the main difference is that the KwaZulu-Natal province's average production output, income generated and expenditure based on capital layout stem from ecotourism, whereas the other provinces stem from breeding, hunting and mixed farming. The average production output, income generated and expenditure based on capital layout from mixed farming is especially high in the Mpumalanga province. In most provinces, the largest percentage of private wildlife establishments have been operating for less than 20 years.

5.5.10 SUMMARY OF PROVINCAL RESULTS

Table 5.27 summarises the empirical results per province and indicate land-use preferences of the interviewees from different provinces.

Table 5.27: Summary of provincial empirical results

	Demographic information		Land-use					Capital spent		
	Average size of land (hectares)	Average years operating	Breeding practices		Production output	Income generated	Expenditure	Land	Animals	Infra-structure
			Category	Environment						
Gauteng	1830	13	High Value	Controlled	Breeding & Hunting (30%)	Breeding (58%)	Breeding (60%)	<0,5 million	R5 - R10 million	R0,5 - R1 million
Limpopo	3863	18	No distinct difference		Breeding (38%)	Breeding (40%)	Breeding (40%)	R10 - R20 million	R30+ million	R3 - R5 million
Mpumalanga	1457	11	Plains game	Extensive	Mixed farming (48%)	Mixed farming (36%)	Mixed farming (35%)	R5 - R10 million	<R0,5 million	R5 - R20 million
Eastern Cape	3900	16	Plains game	Extensive	Hunting (40%)	Breeding (65%)	Breeding (61%)	R30+ million	<R0,5 - R30+ million	<R0,5 - R30+ million
Western Cape	5553	13	Plains game	Semi-extensive	Mixed farming (35%)	Mixed farming (70%)	Mixed farming (45%)	R30+ million	R1 - R2 million	R30+ million
Northern Cape	11440	18	Plains game	Extensive	Breeding (39%)	Breeding (45%)	Breeding (43%)	R30+ million	R30+ million	R30+ million
North West	1827	11	Plains game	Controlled & Extensive	Breeding (39%)	Breeding (46%)	Breeding (42%)	R10 - R20 million	R10 - R20 million	R30+ million
KwaZulu-Natal	4310	18	Plains game	Extensive	Ecotourism (64%)	Ecotourism (63%)	Ecotourism (63%)	R30+ million	R30+ million	R30+ million
Free State	3170	20	High Value	Controlled	Mixed farming (39%)	Breeding (53%)	Breeding (47%)	R5 - R10 & R20 - R30 million	R30+ million	R10+ million

5.5.10.1 Provincial demographic data summary

- **Land size**

The Northern Cape province has the largest private wildlife establishments in terms of average land size (11 440ha). This is followed by private wildlife establishments in the Western Cape province that vary from small to large private wildlife establishments with an average land size of 5 553ha in size. The smallest private wildlife establishments, in terms of land size, are found in the Mpumalanga province with an average of 1 457ha and the North West province with an average of 1 827ha.

- **Years operating**

The average number of years the private wildlife establishments whose owners were interviewed have been operating varies from 11 to 20 years. Considering the averages, the Free State provinces' private wildlife establishments have been operating the longest – an average of 20 years. This is followed by the Limpopo province, Northern Cape province and KwaZulu-Natal province that have been operating for an average of 18 years. This is consistent with secondary data discussed in chapters 1 and 2 that indicated that the industry showed high growth when environmental and agricultural legislation in 1994 allowed landowners to fence off their land and take ownership of wildlife.

5.5.10.2 Provincial land-use summary

- **Breeding**

The Gauteng province and the Free State province focus on breeding with high value species in controlled environments. The Mpumalanga province, Eastern Cape province, Western Cape province, Northern Cape province, North West province and KwaZulu-Natal province focus on breeding with plains game. Of these provinces, the Mpumalanga, Eastern Cape, Northern Cape and KwaZulu-Natal provinces breed plains game more in extensive environments whereas the Western Cape province breeds plains game in semi-extensive environments. In addition to breeding plains game in an extensive environment, the North West province also breeds plains game in controlled environments. There was no distinct difference between the Limpopo province interviewees on whether high value or plains game is preferred.

- **Production output**

Breeding had the highest average production output in the Limpopo province (38%), the North West province (39%) and the Northern Cape province (39%). The average production output for breeding (30%) and hunting (30%) in the Gauteng province are equal. The only province that had the highest average production output for hunting is the Eastern Cape

province (40%). The highest average production output from the Free State province (39%) and the Mpumalanga province (48%) stem from mixed farming and the only province that had a high average production output from ecotourism is the KwaZulu-Natal province (64%).

- **Income generated**

Breeding generated the highest average income in the Gauteng province (58%), the Limpopo province (40%), the Eastern Cape province (65%), the Northern Cape province (45%), the North West province (46%) and the Free State province (53%). The highest average income generated from other provinces stems from mixed farming in the Mpumalanga province (36%) and the Western Cape province (70%). In the KwaZulu-Natal province, ecotourism generated the highest average income (63%).

- **Expenditure based on capital layout**

Breeding had the highest average expenditure based on capital layout in the Gauteng province (60%), the Limpopo province (40%), the Eastern Cape province (61%), the Northern Cape province (43%), the North West province (42%) and the Free State province (47%). In the Mpumalanga province (35%) and the Western Cape province (45%) the largest average expenditure based on capital layout stem from mixed farming whilst in the KwaZulu-Natal province, the highest average expenditure based on capital layout stem from ecotourism (63%).

5.5.10.3 Provincial land-use summary

- **Capital spent on land**

Considering provincial capital expenditure on land, the Gauteng province's private wildlife owners spent the least amount of capital on land (<R0.5 million). This is followed by the private wildlife establishment owners in the Mpumalanga and Free State provinces that each spent between R5 million to R10 million of capital on land. The private wildlife establishment owners in the North West and Limpopo province each spent between R10 million and R20 million of capital on land. The private wildlife establishment owners in the Eastern Cape province, Western Cape province, Northern Cape province and KwaZulu-Natal province each spent an amount larger than R30 million of capital on land. Free State private wildlife establishment owners spending between R5 million and R10 million and between R20 million and R30 million of capital on land.

- **Capital spent on animals**

The province that spent the least amount of capital on animals is the Mpumalanga province (<R0.5 million). This is followed by the Western Cape province that spent between R1 million and R2 million of capital on animals and the Gauteng province that spent between R5 million

and R10 million and the North West province that spent between R10 million and R20 million of capital on animals. The other provinces all spent amounts larger than R30 million of capital on animals. The Eastern Cape province's capital spent on animals ranged equally between <R0.5 million and larger than R30 million.

Considering the data on land-use for all provinces, plains game breeding in extensive environments is the most popular breeding practice applied. In the largest percentage of provinces, breeding was indicated as the land-use form that has the highest average production output, average income generated and average expenditure based on capital layout. It was only in the KwaZulu-Natal province that ecotourism had the highest average production output, average income generated and highest average expenditure based on capital outlay.

- **Capital spent on infrastructure**

The Western Cape province, Northern Cape province, North West province and KwaZulu-Natal province all spent more than R30 million of capital on infrastructure. The Gauteng province spent the least capital on infrastructure (between R0.5 million and R1 million). This is followed by the Mpumalanga province that spent between R5 million and R20 million of capital on infrastructure. The capital spent on infrastructure in the Eastern Cape province (R<0.5 million to larger than R30 million) and the Free State (R10 million to larger than R30 million) provinces varied equally between respondents.

Considering the capital spent in all three categories (land, animals and infrastructure) and the different provinces, the KwaZulu-Natal province and the Northern Cape have spent the most capital – more than R30 million for each category. The Gauteng province has, overall, spent the least capital considering all three categories. The Eastern Cape province has had the widest range of capital spent according to the interviewees.

5.5 CONCLUSIONS

The aim of this chapter was to explain the methodology and empirical results. The discussion on the methodology explained the research design, sample, data recording and data analysis. The chapter also gave the empirical results that were divided into six sections. The first section was demographic information that related to the location of private wildlife establishments, biomes, species, employees, type of business form, size of the business and how long the operations have been in existence. The second section focused on land-use forms implemented by private wildlife establishments that include breeding, hunting, ecotourism, by-products and mixed farming as well as, on limited occasions, other land-use forms. The third section focused on economic aspects that explained the average production output, income generated, expenditure based on capital layout as well as capital

invested in land, animals and infrastructure. The fourth section focused on challenges experienced whilst the fifth section focused on possible future investments. Lastly, other suggestions made by private wildlife establishments were discussed. The last section focused on provincial land-use. Empirical results for each province focused on demographic information, land-use and capital spent. In all cases, with the exception of the KwaZulu-Natal province, breeding, hunting and mixed farming were the most popular land-use forms. Ecotourism and by-products showed the greatest potential growth. The last discussion ended with Table 5.25 that highlights the individual provinces' land-use. The next chapter focuses on recommendations and conclusions.

CHAPTER 6

CONCLUSIONS OF THE RESEARCH AND CONTRIBUTIONS

6.1 INTRODUCTION

The primary objective of this research was to develop a land-use management model for the private wildlife industry of South Africa. To reach the primary objective, five secondary objectives were set in chapter 1. These objectives are given again together with an indication of the chapter in which the objectives was reached.

- Objective 1 was to gain information on the four pillars of the private wildlife industry, infrastructure needed and mixed farming practices in South Africa. This objective was reached in chapter 2, where literature was studied and discussed. The literature relates to the current four pillars of the private wildlife industry, ecotourism, hunting, breeding and by-products. This chapter also studied infrastructure related to game farms and focused on the different infrastructure needed for different land-uses as it related to roads, water, fences, staff and tourist facilities and infrastructure needed for specific pillars.
- Objective 2 was to analyse the biomes, climate change and diseases that impact land-use and wildlife species of the private wildlife industry. This objective was reached in chapter 3, where national and provincial legislation directly related to the private wildlife industry were discussed. Chapter 3 compared the legislation of different provinces as it related to different species, fencing regulations, translocation, hunting protocols, hybridisation and permits.
- Objective 3 was to investigate current legislation and its impact on the species and land-use practices in South Africa on the private wildlife industry. This objective was reached in chapter 4 where the different biomes were discussed, including the climate within certain biomes and the species found in these biomes. Different animal diseases were discussed, and the discussion focused on the species most impacted by the disease, how the disease is spread and how the disease can be contained.
- Objective 4 was to conduct research on the current land-use of the private wildlife industry in South Africa. This objective set out to collect primary data from the private wildlife industry. Primary data collection involves using a research instrument as a guideline to interview (qualitatively) owners of private wildlife establishments at different wildlife auctions. Auctions were chosen as most private wildlife establishment owners will, at some stage, visit auctions to buy or sell

wildlife. Auctions were carefully selected in different provinces of South Africa to include as many as possible private wildlife establishment owners in the research.

- Objective 5 was to draw conclusions and make recommendations on land-use management in the private wildlife industry and to give the contribution of this research. This objective aimed to draw conclusions and make recommendations on the literature review of chapters 2, 3 and 4 and the empirical results of chapter 5. In addition to conclusions and recommendations, this chapter also discussed the contributions of the research study, depicted and discussed the land-use management models and discussed limitations and possible research opportunities for other researchers. The aim of this chapter is to address Objective 5. This chapter is outlined as indicated by Figure 6.1.

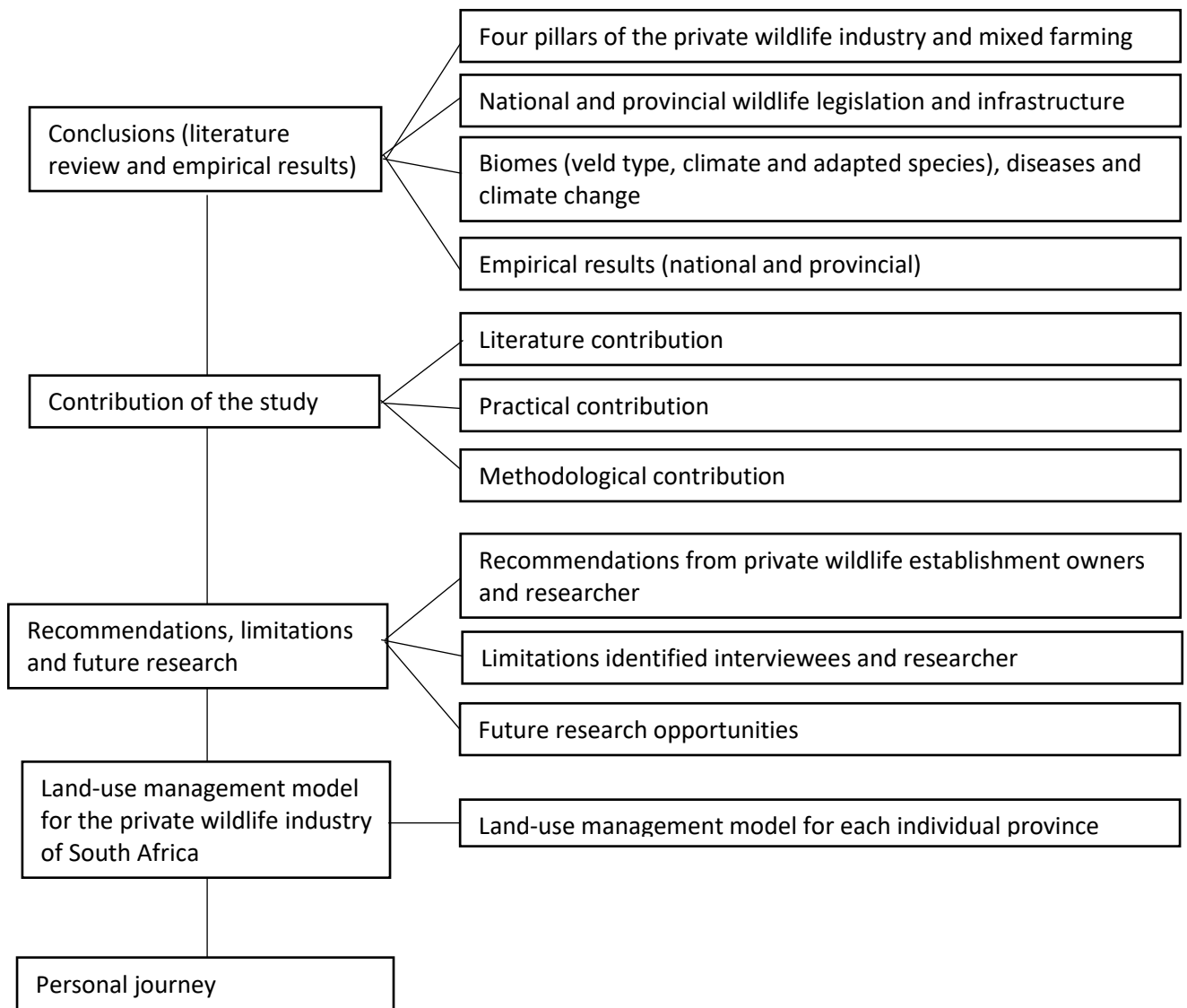


Figure 6.1: Chapter outline

6.2 CONCLUSIONS DRAWN FROM STUDY

The conclusion consists of two sections, Section 6.2.1 that gives the conclusions that stem from the literature studied and Section 6.2.2 that gives conclusions that stem from the empirical results of the study.

6.2.1 Conclusions regarding literature analyses

The following section concludes literature analyses that stem from chapters 1, 2, 3 and 4.

6.2.1.1 Conclusions regarding the private wildlife industry and land-use (four pillars),

General information on the private wildlife industry (chapter 1)

- The background to the study incorporates the role of management within the private wildlife industry, the animals' habitat, ecosystems that impact the habitat, goods and services that stem from the animals and their habitat (c.f. 1.2).
- Land-use can be incorporated in different ways. Depending on the animal species, land-use can be planned to incorporate one or more of the pillars – breeding, hunting, by-products, and ecotourism coupled with mixed farming. The goal of land-use forms, regardless of the pillars implemented, should be long-term conservation and sustainability (c.f. 1.2)
- Before this study, there was a lack of information on land-use that relates specifically to wildlife on privately owned establishments within different biomes and different sized establishments. The lack of land-use information made it difficult to estimate economic and environmental best practices (c.f. 1.3).
- Definitions of land-use, the wildlife industry, game farms and wildlife ranches, conservation, hunting and wildlife tourism as well as consumptive and non-consumptive tourism and ecotourism were given (c.f. 1.7).

Pillars of the private wildlife industry (chapter 2)

The private wildlife industry consists of four pillars, and each pillar is further subdivided into subcategories (c.f. 2.2).

- **Pillar 1:** The first pillar is wildlife tourism (c.f. 2.2.1.6) that consists of human relations between humans and animals when travelling (c.f. 2.2.1.3), nature-based tourism where nature is the reason to travel (c.f. 2.2.1.1), rural tourism where people travel to sparsely populated areas (c.f. 2.2.1.5), ecotourism where individuals travel to admire animals (c.f. 2.2.1.2) and consumptive activities that include hunting (c.f. 2.2.1.4). This research study's primary data collection focused specifically on ecotourism.

- **Pillar 2:** The second pillar is hunting that consists of biltong hunting, trophy hunting and wing shooting (c.f. 2.2.2). This research study's primary data collection focused on trophy and biltong hunting only.
 - Biltong hunting involves hunting to obtain meat and is mostly done by South African middle-aged men who hunt preferred species such as springbok, impala, gemsbok and kudu (to name but a few (c.f. 2.2.2.1))
 - Trophy hunting involves hunting animals to obtain undamaged skin, head, tusks or horns. This type of hunting is mostly practised by international hunters that prefer species such as springbok, gemsbok, blue wildebeest, kudu and buffalo as well as the Big 5 (c.f. 2.2.2.2).
- **Pillar 3:** The third pillar is by-products that can stem from game meat, animal skin, bones and horns and other parts of the animals. These parts of the animals are used for a variety of products that include biltong and droëwors, shoes and car seats, art and medicinal and cultural products (c.f. 2.2.3).
- **Pillar 4:** The fourth pillar is game breeding and sales that involve breeding high value and plains game in extensive, semi-extensive or controlled environments (c.f. 2.2.4) and is done to satisfy the demands of trophy hunters and to counter threats of habitat destruction and environmental changes (c.f. 2.2.4.1).

Mixed farming (chapter 2)

- Mixed farming involves stock or crop farming that is done in conjunction with owning wildlife (c.f. 2.3).
- Mixed farming is a viable land-use form as stock and crop farming alone tend to have lower revenues than wildlife farming wildlife are less dependent on water (c.f. 2.3.1).

The infrastructure needed to incorporate pillars into land-use (chapter 2)

- Any land-use activity requires infrastructure. Examples are:
 - Fences that surround a property or that are put up to divide the property into smaller sections (c.f.2.4.1).
 - Building dams or other infrastructure to store water – especially in drier areas where artificial water is needed (c.f. 2.4.2)
 - Roads used by tourists, hunters or management of private wildlife establishments (c.f. 2.4.3).
 - Infrastructure that is needed by staff. Such infrastructure includes staff accommodation and work spaces that includes offices and warehouses (c.f. 2.4.4)

- The infrastructure needed by tourists. Such infrastructure includes accommodation, recreational facilities, restaurants and infrastructure associated with conferences and events (c.f. 2.4.5).
- Pillar-specific infrastructure. The hunting-pillar needs accommodation for hunters, abattoir-facilities and trophy rooms (c.f. 2.4.6) while breeding requires camps, fences and holding pens to protect animals (c.f.2.4.7).

6.2.1.2 Conclusions regarding legislation (chapter 3)

- National legislation that directly impacts private wildlife establishments relates to land-affairs, employees in the workplace, animal health, agriculture-related aspects and the protection of the natural environment (c.f. 3.2).
- Provincial legislation involves legislation that indicates hunting protocols (c.f. 3.3) as well as provincial legislation that relates to specific species, fences, permits, hunting, translocation and hybridisation. In each province, the legislation is different (c.f. 3.4)
- Each province has different hunting protocols that change as species classification change. These hunting protocols classify game within the province as protected species, specially protected species or ordinary game. Provincial legislation also indicates which wildlife species can be hunted during different times of the year and in what numbers, under what conditions permits are necessary to hunt and the protocol to hunt on an exempted private wildlife establishment or a non-exempted private wildlife establishment (c.f. 3.3.1 – c.f. 3.3.9).
- Different provincial legislation focuses on different species, and the provincial legislation for each species is different (c.f. 3.5). The species that have specific provincial legislation attached are:
 - Bontebok and blesbok: Hybridisation is prevented through provincial translocation, hunting and fencing laws that vary per province. In provinces, such as the Western and Eastern Cape, where both bontebok and blesbok occur, provincial legislation is stricter and involves fencing regulations, rules on translocation, genetic testing and special permits. In other provinces, such as KwaZulu-Natal and Mpumalanga provinces, the legislation does not mention the bontebok as the bontebok does not occur in these provinces. Provincial legislation does, however, mention specific legislation that relates to the hunting of the blesbok (c.f. 3.5.1).
 - Buffalo: Provincial legislation for buffalo aims to prevent diseases. Disease-free buffalo represent a high commodity, especially amongst trophy hunters and breeders, and especially in the Eastern Cape. Legislation relates to

translocation that prevents disease-free buffalo mixing with buffalo that have diseases (c.f. 3.5.2). Provincial legislation varies and states that a 1.4 to 1.8-metre fence is necessary, depending on the province in which buffalo are kept. In some provinces, such as the KwaZulu-Natal, Limpopo and Mpumalanga provinces, fences must be electrified. Certain provincial legislation stipulates that permits are needed to hunt buffalo, to own buffalo, and to prove that buffalo are disease-free. The hunting seasons also vary for buffalo. In some cases buffalo can be hunted throughout the year and in other provinces only between 31 May and 31 August (c.f. 3.5.2)

- Predators: Predators include lions, leopards and cheetah and are popular amongst private wildlife establishments that incorporate tourism. Permits are necessary to own, sell and hunt predators in all provinces and double fences, of which one is electrified, are stipulated in provincial legislation. Similarly to fencing regulations for buffalo, the height of fences varies per province from 1.5 to 3 metres. Fence heights are also dependent on the type of predator owned (c.f. 3.5.3).
- Rhino: Provincial legislation is mostly incorporated to prevent poaching. Licences and permits are necessary to own or hunt rhino in most provinces and, in certain provinces, provincial legislation indicated fences need to be higher than 1.4 metres (c. f. 3.5.4).
- Black and blue wildebeest: Hybridisation laws aim to prevent the cross-breeding between the black and blue wildebeest. Permits are necessary to hunt, transport and own the species and some provinces have fencing regulations that aim to keep the two species apart (c.f. 3.5.5).
- Zebra: Hybridisation laws aim to prevent cross-breeding between different species of zebra and prevent the translocation of zebras outside the natural distribution range. The legislation is strict about the Cape Mountain Zebra within the Eastern and Western Cape. For example, translocation is prohibited to other provinces that have biomes that are less desirable or in which Cape Mountain zebra do not naturally occur. For the other zebra species, permits are necessary to hunt and translocate zebras (c.f. 3.5.6).
- Roan and sable: The aim of the provincial legislation is to prevent hybridisation. Different permits are necessary to hunt, own and translocate the species (c.f. 3.5.7).

6.2.1.3 Conclusions on biomes, diseases and climate change (chapter 4)

- South Africa has nine biomes. The climatic conditions within the biomes vary and the some species adapt easier than other to the natural elements associated with different biomes.
- Different animals are impacted by different diseases (c.f. 4.3). In some cases, legislation has been put in place to counter or prevent diseases (chapter 3). The diseases discussed were:
 - Anthrax: Legislation is in place to prevent the disease from spreading between animals and between animals and humans. There are specific protocols to follow if animals die of anthrax (c.f. 4.3.1).
 - Tuberculosis: The disease spreads easily between animals and between animals and humans and is difficult to detect (c.f. 4.3.2).
 - Brucellosis: The disease is very contagious and can spread between animals and between animals and humans (c.f. 4.3.3).
 - Trueperella: Easily treated, but non-infected animals should be kept separate from animals that have the disease (c.f. 4.3.4).
 - Food and mouth disease: Occurs mostly in Mpumalanga province, Limpopo province and KwaZulu-Natal province and buffalo are the main carriers. Legislation and permits are in place to prevent the spread of the disease (c.f. 4.3.5).
 - Bovine Malignant Catarrhal Fever: Impacts mostly blue and black wildebeest as well as cattle (c.f. 4.3.6).
 - Swine flu: There are no symptoms for this disease and the disease impacts warthogs, bush pigs and domestic pigs. Vaccinations exist, and there is legislation in place regarding translocation to help minimise the spread of the disease and its impacts (c.f. 4.3.7).
 - Heartwater: The disease impacts mostly livestock and, to a lesser extent, wildlife in the northern parts of South Africa (c.f. 4.3.8).
 - Rabies: Is spread between animals and animals and humans. However, vaccines exist to prevent the disease (c.f. 4.3.9).
 - Corridor and buffalo disease: The disease is spread between buffalo and cattle in the Mpumalanga province and Limpopo province. Preventative measures include dipping cattle and putting up fences for wildlife (c.f. 4.3.10).
- Climate change impacts the vegetation of biomes and therefore the species that occur in a certain area. In future, because of climate change, biomes may change

and therefore the species that private wildlife establishment owners keep may have to be changed to adapt to different vegetation and climatic conditions (c.f. 4.4).

6.2.2 Conclusions regarding the empirical results of this research (chapter 5)

This section is divided into two sub-sections. First, conclusions concerning land-use for all provinces combined and, second, conclusions for provincial land-use, meaning the land-use of each province for the wildlife industry.

6.2.2.1 Conclusions on empirical results: land-use all nine provinces combined

- Section 1: Conclusions on demographic information of the private wildlife industry
 - Provincial breakdown: The majority of interviewees came from the Limpopo province. This was followed by the Northern Cape and the North West provinces (c.f. 5.3.1.1).
 - Number of districts: Interviewees from the Limpopo province stem from 44 districts. The most listed districts are Thabazimbi and Stofberg. This is followed by the Northern Cape being from 19 districts, with the most listed districts as Kimberley, Colesburg and Douglas. Regarding the North West province, 14 districts were mentioned with Brits and Swartruggens as the most important districts (c.f. 5.3.1.2).
 - Biomes where wildlife establishments are located: The majority of private wildlife establishments are located in the Savannah biomes which are followed by the Grassland biomes. The number of interviewees per province that occur in a specific biome was also indicated (c.f. 5.3.1.3).
 - Reason for operation at current location: Proximity to cities, airports and border posts are seen as the most important reason for the operation being in its current location. Second to that was Nostalgia (growing up on the establishment or inheriting it), ideal natural environmental conditions, financial benefits, aesthetics and the love of nature (c.f. 5.3.1.4).
 - Business form: The main business form is sole proprietorship which is followed by trusts and PTYs (c.f. 5.3.1.5).
 - Size of wildlife establishments: The average size of private wildlife establishments was 4 744ha (c.f. 5.3.1.6).
 - Species owned: The most popular species found on the establishments are kudu, impala, nyala, common duiker, blue wildebeest, gemsbok, blesbok, steenbok and waterbuck (c.f. 5.3.1.7).
 - Years operational: The average private wildlife establishment has existed for 17.7 years (c.f. 5.3.1.8).

- Employees: The largest percentage of private wildlife establishments interviewed employ permanent employees. On average, seven permanent and six part-time employees are employed per establishment (c.f. 5.3.1.9).
- Section 2: Conclusions regarding empirical results relate to land-use:
 - Production output: Breeding has the highest production output. This is followed by mixed farming and hunting (c.f. 5.3.2.1).
 - Value-adding activities: Interviewees identified weddings, conferences, warrior races, team building events, religious retreats, wine-related activities as well as offering accommodation, training and curio shops as value-adding activities (c.f. 5.3.2.2).
 - Breeding of game species: Interviewees prefer plains game breeding in extensive environments (c.f.5.3.2.3).
- Section 3: Conclusions on the economics of private wildlife establishments:
 - Expenditure on the capital layout: Breeding has the highest expenditure based on the capital layout per pillar. This is followed by hunting and mixed farming (c.f. 5.3.3.1).
 - Capital spent on land: The largest percentage of interviewees had spent more than R30 million on land (c.f. 5.3.3.2).
 - Capital spent on animals: The largest percentage of interviewees had spent more than R30 million on animals (c.f. 5.3.3.2).
 - Capital spent on infrastructure: An equal percentage of respondents had spent either more than R30 million or less than R1 million of their capital on infrastructure-related aspects (c.f. 5.3.3.2).
 - Capital invested in the last five years: The biggest capital investment in the last five years was on game, infrastructure, land, breeding, tourism, mixed farming and managerial aspects that include labour, marketing and conservation (c.f. 5.3.3.3).
 - Capital income received from land-use forms: Breeding generated the highest average income. This is followed by hunting and mixed farming (c.f. 5.3.3.4).
 - Return on investments: Interviewees indicated that the best return on investment is received from game, land, the natural environment, consumptive use of wildlife (hunting), breeding and ecotourism (c.f. 5.3.3.5).
- Section 4: Conclusions regarding the challenges associated with the private wildlife industry:

The main challenges associated with the private wildlife industry are: (c.f. 5.3.4).

- Species-related challenges such as problem animals, genetics, diseases and knowledge.
- Governmental and legislative challenges include legislation in general, the government in general and, more specifically, permits, licences and land-claims.
- Infrastructure-related challenges include the building of lodges and developing hiking trails.
- Managerial challenges included labour, poaching, clients, quality, marketing, farm safety, artificial water and feed, competition, the trust of other parties, knowledge and theft.
- Environmental challenges include climate and natural vegetation.
- Economic challenges include the decrease of game prices, covering expenses, correct capital investments, supply and demand and the economy in general.
- Wildlife industry challenges include the saturation of the market, marketing of the industry and attracting buyers.
- Lastly, challenges that relate to land-use forms that include decisions on which land-use activity to expand and the quality of land-use forms.
- Section 5: Conclusions on future private wildlife establishment expansions: (c.f. 5.3.5)

Future expansions planned relate to: (c.f. 5.3.5)

- Species that relate to buying more animals and, in some cases, specific species. Interviewees also indicated that future investment of species would consider the genetics of the species, colour variants, high-value species and exotic game.
- Consumptive use of species that relate to expanding hunting as a land-use activity and attracting more international hunters.
- Infrastructure that includes new types of accommodation establishments (lodges, camps, tented houses) restaurants and roads.
- Land that relates to private wildlife owners buying additional properties with the aim of increasing the size of the private wildlife establishment.
- Ecotourism related expansions include 4x4 routes, game drives, hiking trails and other activities not specified.
- Managerial aspects considered include economies of scale, liaising with retailers, international markets, employees and marketing.
- Breeding that relates to private wildlife establishments planning to breed with specific species and exotic animals in future.

- Additional land-use forms that include mixed farming (citrus, pig, blueberry and seed farming) as well as taxidermy services.
- Section 6: Suggestion from industry: (c.f. 5.3.6):
Interviewees were also given the opportunity to offer suggestions to other wildlife industry stakeholders. These suggestion were that:
 - Industry knowledge is important.
 - Nature must be appreciated.
 - Hard work is necessary.
 - Alternative sources of income are important – thus incorporate multiple pillars as part of land-use.
 - Test the market and enter the industry at the right time.
 - Consider marketing private wildlife establishments and land-uses.
 - Understand the legalities of the industry.
 - The government should play a greater role.
 - Quality genetics are important.
 - The species bought, veld management and feed should be considered.
- Land size compared to land-use
In this section, the land size of the private wildlife establishments whose owners were interviewed were compared in terms of the production output, income generated and expenditure based on capital layout for each pillar. The results are discussed below.
 - Land size measured according to the different pillars regarding average production output: Breeding and hunting have the highest average production output on private wildlife establishments that are larger than 3 001ha in size, whereas mixed farming has the highest average production output for wildlife establishments that are smaller than 1 000ha (c.f. 5.4.1)
 - Land size measured according to the different pillars regarding capital layout: Breeding has the highest average expenditure based on the capital layout on private wildlife establishments larger than 3 001ha while mixed farming has the highest average expenditure based on the capital layout on private wildlife establishments smaller than 1 000ha. There is no distinct difference in the size of the private wildlife establishment and the average expenditure based on the capital layout for ecotourism and by-products (c.f. 5.4.2).
 - Land size measured according to the different pillars regarding income generated: Breeding generates the highest average income for wildlife

establishments larger than 3 001ha while mixed farming generates the highest average income on private wildlife establishments smaller than 1 000ha. There is no distinct difference in the average income received on small, medium and large private wildlife establishments.

6.2.2.2 Conclusions regarding provincial land-use

The next section gives the main conclusions that relate to the breakdown per province.

- Conclusions on land-use in the Gauteng province (c.f. 5.6.1):
 - The size of the land of private wildlife establishments in the Gauteng province ranges mostly between 1 001 and 2 000ha.
 - The most popular species owned in the Gauteng province are Burchell's zebra, springbok, impala, common duiker and blesbok.
 - The largest percentage of private wildlife establishments in the Gauteng province has been operating between 11 and 20 years.
 - Breeding with high-value species is mostly done in controlled environments.
 - Breeding and hunting have the highest average production output.
 - Breeding generates the highest average income and highest average expenditure based on the capital layout.
- Conclusions on land-use in the Limpopo province (c.f. 5.6.2):
 - The size of the land of private wildlife establishments in the Limpopo province is mostly smaller than 2 000ha.
 - The most popular species owned in the Limpopo province are impala, kudu, nyala, common duiker, blue wildebeest and waterbuck (similar to those found in the Gauteng province).
 - The largest percentage of private wildlife establishments in the Limpopo province have been operating for less than 10 years and between 11 and 20 years.
 - There is no distinct difference between the preferences for breeding with high value or plains game and whether breeding is preferred in controlled, semi-extensive or extensive environments.
 - Breeding and hunting have the highest average production output. This is followed by mixed farming.
 - Breeding and hunting generate the highest average income and highest average expenditure based on the capital layout. This is followed by mixed farming.

- Conclusions on land-use in the Mpumalanga province (c.f. 5.6.3):
 - The size of the land of private wildlife establishments in the Mpumalanga province is mostly smaller than 1 000ha.
 - The most popular species owned in the Mpumalanga province are black wildebeest, common duiker, Burchell's zebra, springbok and gemsbok.
 - The largest percentage of private wildlife establishments in the Mpumalanga province have been operating for less than 10 years.
 - Breeding plains game in extensive environments is preferred.
 - Mixed farming has the highest average production output.
 - Mixed farming generates the highest average income. This is followed by hunting.
 - Mixed farming has the highest average expenditure based on the capital layout. This is followed by breeding.
- Conclusions on land-use in the Eastern Cape province (c.f. 5.6.4):
 - The size of the land of private wildlife establishments in the Eastern Cape province ranges mostly between 4 001 and 5 000ha.
 - The most popular species owned in the Eastern Cape province are steenbok, springbok, sable, common duiker, buffalo and aardvark.
 - The largest percentage of private wildlife establishments in the Eastern Cape province have been operating for between 11 and 20 years.
 - Breeding with plains game is mostly done in extensive environments (similar to breeding practices in the Mpumalanga province).
 - Hunting has the highest average production output. This is followed by breeding.
 - Breeding generates the highest average income and has the highest average expenditure based on the capital layout.
- Conclusions on land-use in the Western Cape province (c.f. 5.6.5):
 - The size of the land of private wildlife establishments in the Western Cape province ranges mostly between being smaller than 1 000ha, between 6 001 and 7 000ha or larger than 8 001ha.
 - The most popular species owned in the Western Cape province are Burchell's zebra, springbok, red hartebeest, waterbuck, kudu, gemsbok, common duiker and black and blue wildebeest.
 - The largest percentage of private wildlife establishments in the Western Cape province have been operating for between 11 and 20 years.
 - Breeding with plains game is mostly done in semi-extensive environments.

- Mixed farming has the highest average production output which is followed by other land-uses that do not relate to wildlife (such as religious activities and educational activities).
- Mixed farming generates the highest average income and the highest average expenditure based on the capital layout. This is followed by breeding.
- Conclusions on land-use in the Northern Cape province (c.f. 5.6.6):
 - The size of the land of private wildlife establishments in the Northern Cape province is mostly larger than 8 001ha.
 - The most popular species owned in the Northern Cape province are springbok, gemsbok, kudu, steenbok, eland, impala and common duiker.
 - The largest percentage of private wildlife establishments in the Northern Cape province have been operating for less than 20 years.
 - Breeding with plains game is mostly done in extensive environments.
 - Breeding and hunting have the highest average production output.
 - Breeding and hunting generate the highest average income and the highest average expenditure based on the capital layout. This is followed by breeding.
- Conclusions on land-use in the North West province (c.f. 5.6.7):
 - The size of the land of private wildlife establishments in the North West province is mostly smaller than 1 000ha.
 - The most popular species owned in the North West province are nyala, kudu, impala, blue wildebeest, blesbok, common duiker, waterbuck and springbok.
 - The largest percentage of private wildlife establishments in the North West province have been operating for less than 10 years.
 - Breeding with plains game is mostly done in either extensive or controlled environments.
 - Breeding and mixed farming have the highest average production output.
 - Breeding generates the highest average income and the highest average expenditure based on the capital layout. This is followed by breeding.
- Conclusions on land-use in the KwaZulu-Natal province (c.f. 5.6.8):
 - The size of the land of private wildlife establishments in the KwaZulu-Natal province is mostly either smaller than 1 000ha, between 3 001 and 4 000ha or larger than 8 001ha.
 - The most popular species owned in the KwaZulu-Natal province are nyala, leopard, kudu, giraffe, bush pic, blue wildebeest and aardvark. Some of these

species are different to those in the other provinces, such as leopard, giraffe and bush pig.

- The largest percentage of private wildlife establishments have been operating between 11 and 20 years.
- Breeding with plains game is mostly done in extensive environments.
- Ecotourism has the highest average production output. The KwaZulu-Natal province is the only province in which ecotourism has a high percentage of production output.
- Ecotourism has the highest average income and the highest average expenditure based on the capital layout.
- Conclusions on land-use in the Free State province (c.f. 5.6.9):
 - The size of the land of private wildlife establishments in the Free State province ranges mostly between 4 001 and 5 000ha.
 - The most popular species owned in the Free State province are springbok, nyala, blesbok, sable, impala and kudu.
 - The largest percentage of private wildlife establishments in the Free State province have been operating for less than 20 years.
 - Breeding with high-value game is mostly done in controlled environments.
 - Mixed farming and breeding have the highest average production output.
 - Breeding has the highest average income and the highest average expenditure based on the capital layout.
- Conclusions based on the comparison of the different provinces (c.f. 5.6.10)
 - The largest average farms are found within the Northern Cape province and the smallest average farms in Mpumalanga province (c.f. 5.6.10.1). The different sizes relate to the veld types and carrying capacity that, in turn, impact the pillars that are more or less suitable for smaller and larger land sizes and the influences of the average production output, income generated and expenditure based on the capital layout.
 - All provinces, except the Gauteng and Free State provinces, prefer to breed with plains game. Gauteng and the Free State provinces prefer to breed with high-value species. In the Limpopo province, there was no definite distinction between breeding with high value or plains game (c.f. 5.6.10.2).
 - The highest production output stems from breeding, mixed farming and hunting. Ecotourism's production output was the highest for the KwaZulu-Natal province.
 - By-products production output, income generated and expenditure based on the capital layout are lowest for all the provinces.

- Breeding generates the highest average income and has the highest expenditure based on the capital layout in all provinces except in the Mpumalanga and Western Cape provinces, that generate the highest average income and have the highest expenditure based on a capital layout from mixed farming. KwaZulu-Natal province generates the highest average income and has the highest expenditure based on the capital layout for ecotourism. This indicates that the ecotourism pillar is best developed in the KwaZulu-Natal province. Other provinces should also consider investing in ecotourism – similar to by-products.
- The capital spent on land, animals and infrastructure differs per province and is the highest in KwaZulu-Natal and Northern Cape provinces with the lowest in Gauteng province.

6.3 KEY FINDINGS

From the results the following key findings can be listed:

- Breeding and hunting are the two most popular land-use forms. Although breeding is a key land-use form, the fluctuation in prices for game sold at auctions makes it vulnerable. As the private wildlife industry is profit driven, land-use forms that is not profitable will not be attractive to product owners.
- Breeding and hunting, together with ecotourism, are the most capital-intensive land-use forms and the most expensive to develop.
- Smaller farms tend to focus more on breeding as land-use, whereas larger farms implement more land-use forms.
- Larger farms are more commonly found in the Kalahari and Karoo Biomes located in the Northern Cape, North West and Eastern Cape provinces.
- The province where the farm is located influences land-use. For example, Gauteng focuses more on breeding. In the North West and Free State provinces mixed farming (crop farming) is part of the land-use. For the Eastern Cape province hunting is an important land-use form.
- By-products and meat products as a land-use form have potential for future growth. This is therefore a land-use form that one can invest in, in the future.
- Mixed farming is an important land-use form of wildlife establishments as it allows land to be optimally utilised. Again, for land-owners, the private wildlife industry is about making a profit. As they say in the industry “*if it pays it stays*”

- Private wildlife establishments are one of the biggest for employment creation in the rural provinces such as the Limpopo, Northern Cape, North West and Free State provinces.

6.4 CONTRIBUTIONS OF THE STUDY

The research contributions of this study fall within three categories, scholarly or literature contributions, industry or practical contributions and methodological contributions. The contributions of this study to the three categories are discussed below.

6.4.1 Literature contributions

- Existing literature mentions the four pillars but does not indicate mixed farming as a land-use form that is incorporated as part of private wildlife establishments. Thus a new literature contribution stems from this study that indicated that mixed farming adds to income and is a viable land-use form for private wildlife farmers.
- After the literature on by-products, hunting and breeding and game sales was researched, the literature was summarised and depicted in three figures. The new figures for hunting (Figure 2.4), breeding (Figure 2.6) and by-products (Figure 2.5) were created, based on literature, and combined with the Figure 2.3 on wildlife tourism by Page and Dowling (2002). The new figure (Figure 2.2) summarises the elements that make up the traditional four pillars of the private wildlife industry. No other work could be found that included the various activities that make up each pillar. According to the author's knowledge, there is no literature where all the provincial legislation that directly relates to the private wildlife industry was summarised and compared from one source – especially in a universal manner as each province's legislation has a different layout, different content and was either new or has been in existence for a longer period. This research study, at the time of completion, offers an up-to-date summary and comparison of provincial legislation concerning the private wildlife industry. The provincial legislation that relates to the private wildlife industry was summarised and compared considering legislation that relates to hunting, hybridisation, species, fencing, translocation and permits.

6.4.2 Practical-contributions

The study made the following practical contributions to the private wildlife industry of South Africa:

- A land-use management model for the South African private wildlife industry was developed. The South African land-use management models allow private wildlife

establishments to see which combinations of land-use forms can generate the highest average income. The South African land-use management model also indicates land-use forms as well as internal and external factors that impact private wildlife establishments. The same elements (average income generated, land-use forms, internal and external factors) were also indicated in the land-use management models for the nine provinces of South Africa.

- Land-use management models for each province were developed. Different provinces have different ideal land-uses because of differences in legislation and natural elements. These considerations, listed in the land-use models, must be considered when the land-use model is applied.
- Mixed farming is seen as a key land-use form for the private wildlife industry.

6.4.3 Methodological contributions

The methodological contributions are as follows:

- A new research instrument was developed for determining land-use within the private wildlife industry. The instrument includes demographic aspects that included questions on species, employees, land size, geographic location, years of operation, business form and biome of a private wildlife establishment. In addition, the instrument included questions on land-use, economic and financial aspects that related to capital spent, production output, income generated and expenditure based on capital layout. Lastly, the instrument enquired about possible challenges, areas for future expansion and areas of future investment. The development of the research instrument was based on aspects mentioned in secondary research.

6.5 RECOMMENDATIONS

This section gives recommendations concerning the private wildlife industry in general, NGOs such as WRSA and government. Recommendations relevant to the private wildlife industry are:

- Firstly, the most productive land-use forms are breeding and hunting together with stock and crop farming. Therefore, to be sustainable and profitable these land-use forms are seen as most important. It is recommended that owners incorporate more than one land-use form, especially since some land-use forms (such as breeding) are associated with prices that fluctuate.
- Secondly, private wildlife establishment owners should consider land-use forms that are currently less developed, but which have growth potential. Examples are meat production and by-products. Legislation currently hinders the easy development and

growth of some of these land-uses (game meat). Thus, linked to the recommendation that private wildlife establishment owners invest in such land-uses, it is further recommended that government ease the processes and red tape associated with incorporating these land-use forms.

- Private wildlife establishment owners should also consider land size and be knowledgeable about determining suitable land-use forms that can be implemented in private wildlife establishments. On larger farms, such as those mostly found in the Northern Cape, North West and Eastern Cape provinces, it is easier to incorporate more than one land-use.
- Private owners should cooperate with the WRSA to employ, mentor and train local individuals, emerging black farmers, to ensure the sustainable long-term viability of private wildlife establishments and the industry as a whole.

The following recommendations are made to the NGOs (WRSA):

- Private wildlife establishment owners require knowledge. The WRSA, which has contact with new and existing private wildlife establishment owners, can provide a knowledge platform on the various general aspects private wildlife establishment owners should consider. Examples are: knowledge on the most suitable land-use forms as well as the external and uncontrollable factors and internal and controllable factors indicated as part of the land-use model developed.
- Based on the previous recommendation that the WRSA provide knowledge to new and existing private wildlife establishment owners, it is also recommended that the WRSA provide province-specific land-use information to private wildlife establishment owners located in different provinces. Especially to new and rather inexperienced private wildlife establishment owners (emerging black farmers). For example, existing successful land-uses in the Gauteng province focus on breeding whilst hunting is the main focus in the Eastern Cape province. The North West and Free State provinces incorporate mixed farming as part of land-use.
- The WRSA should share knowledge with wildlife establishment owners about stock and crop farming as well as how best to incorporate the two. The research has shown that mixed farming is a popular land-use form. Thus, apart from knowledge on wildlife species, biomes, land-use forms, vegetation and climates suitable for wildlife, private wildlife establishment owners should be guided on how the natural environment can be used for other forms of farming.

- The WRSA should advocate to government, on behalf of private wildlife establishments, to ease the processes governed by legislation.
- Training could be offered to new owners and employees that focus on the knowledge needed mentioned in the previous two bullets, as well as the practical skills necessary to ensure the sustainable management of private wildlife establishments.

The following recommendations are made to government:

- Legislation impacts land-use activities. Examples are hunting seasons and obtaining permits to hunt and transport hunting trophies and live animals within a province or between provinces. It is recommended to government to provide standardised and easily accessible up-to-date information and access to permits.
- In addition to providing easy access to legislation, government can also ease the processes private wildlife establishments must follow as required by legislation. Examples are the number of permits required for certain land-use activities and the process of applying for permits and licences. Another example is legislation that currently hinders meat production of wildlife. The government must also investigate the export of game meat to other African countries.
- Government could further support the WRSA and other role players with training new private wildlife establishment owners that enter the industry to ensure continuous economic growth and sustainability.

6.6 FUTURE RESEARCH CONSIDERATIONS

The following future research considerations relate to private wildlife industry are put forward:

- Research on the challenges indicated by the interviewees, and to what extent these challenges impact different pillars or land-use forms. Challenges relating to the type of species kept, legislation and environmental elements, amongst others mentioned in chapter 5;
- Opportunities for future investment and return on investment.
- The impact of anti-hunting on the future of the different pillars and whether private wildlife establishment owners are moving away from hunting generally or just the hunting of specific species such as lion.
- Research on transformation and skills development needed for the industry.

- The impact of the prices of game on land-use forms that have increased tremendously in the last year.

6.7 A LAND-USE MANAGEMENT MODEL FOR THE PRIVATE WILDLIFE INDUSTRY OF SOUTH AFRICA

The land-use management model was created based on the secondary data that constituted the literature review in chapters 2, 3 and 4 and the primary data collected and summarised in chapter 5. Figure 6.2 depicts the land-use management model for South Africa.

WILDLIFE LAND-USE MANAGEMENT MODEL FOR SOUTH AFRICA

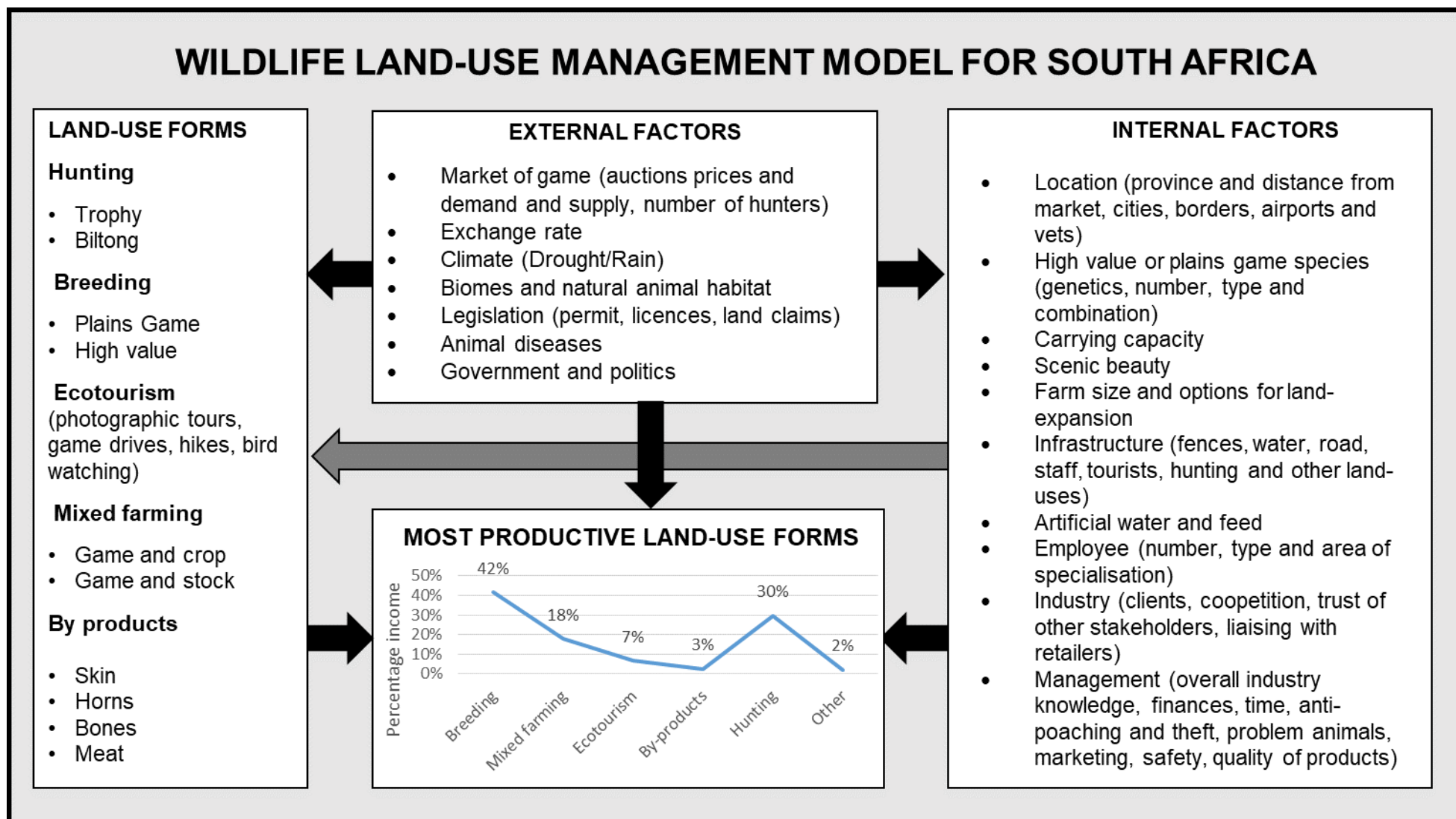


Figure 6.2: Wildlife land-use management model for the private wildlife industry of South Africa

The land-use management model consist of four parts. The external factors, internal factors, the land-use forms and the extent to which the land-use forms generate income and are seen as productive land-use forms. Each of these sections are discussed below.

6.7.1 External factors

These external factors impact the type of land-use forms that private wildlife establishment owners can implement, internal factors and land-use management income indicated in Figure 6.2. The external factors that impact private wildlife establishments include:

- The market: Market-related aspects include the supply and demand of products, the prices of animals at auctions and the size of the market.
- The exchange rate: The exchange rate impact imports and exports and the cost for international clients.
- Climate: A favourable climate includes good rainfall, no droughts and a climate that allows palatable and nutritious vegetation for specific animal species.
- Biomes and natural habitat: The type of vegetation found within a specific region impacts the types of species that private wildlife establishment owners should consider keeping.
- Legislation: Permits, licences and land-claims are examples of how legislation impacts private wildlife establishments.
- Animal diseases: Different animal diseases impact different animals in different parts of South Africa.
- Government and politics: The support received from government and the legislation created impact private wildlife establishments.

6.7.2 Internal factors

The internal factors are impacted by the external environment and, in turn, impact land-use forms and the income and level of productivity of land-use forms that are incorporated into land-use. The internal factors that impact private wildlife establishments include:

- Geographic location: Private wildlife establishments that are located close to cities, airports, borders, markets and vets are seen as more favourable.
- Species: The type and number of species, whether species are classified as high value and/or plains game species and the genetics of animals will influence the land-use forms incorporated into land-use.
- Carrying capacity: The number of animals that can be accommodated on a piece of land varies per province and depends on the species.

- Scenic beauty: The love of nature and the beauty of the natural environment are the reasons that certain private wildlife establishment owners started the wildlife operation.
- Farm size: The size of land and the ability to purchase more land enables private wildlife establishment owners to expand operations and incorporate more pillars into land-use.
- Infrastructure: Different land-uses require different infrastructures. In addition, infrastructure is also necessary for fences, water, roads and staff.
- Artificial water and feed: The decision to have artificial water and feed available will depend on external factors such as climate and biomes.
- Employees: The type of land-use forms incorporated and the size of wildlife establishment may impact the number of employees, whether employees are employed on a permanent or temporary basis and the job specifications of employees.
- Industry: The number and types of clients, competition, trust of other stakeholders, liaising and business with retailers can impact business operations.
- Management: Private wildlife establishment owners and management need to have sufficient industry knowledge, manage finances and time, market their establishment and products, ensure the safety of employees and animals, offer quality products and prevent poaching, theft and problem animals.

6.7.3 Land-use forms

The forms that private wildlife establishment owners choose to incorporate into land-use are influenced by external and internal factors. These factors determine the income generated and productivity of land-use forms. The forms include:

- Hunting: Activities that relate to hunting include trophy hunting and biltong hunting.
- Breeding: Breeding can incorporate breeding with plains game or with high value species in extensive, semi-extensive or controlled environments.
- Ecotourism: Ecotourism activities include hiking, bird watching, photographic tours and game driving.
- Mixed farming: Mixed farming involves either crop farming and game farming or stock farming and game farming.
- By-products: By-products involve using the skin, horns, meat and bones of animals to produce medicinal products (conventional and traditional), arts and crafts, leather products, wares and meat products.

6.7.4 Most productive land-use activity combination

Figures 6.3 to 6.11 indicate the land-use forms and the average percentage income generated from each land-use activity and therefore the productivity of different land-use forms. Overall in South Africa, breeding and hunting are the most productive land-use forms that generate the highest average income. These are followed by mixed farming and ecotourism and by-products that also have growth potential. This, however, differs from province to province.

The provincial land-use combinations of land-use look different and are discussed next.

6.7.5 Provincial land-use management models

Each province has similar internal factors, external factors and land-use forms. However, the internal and external factors have aspects that differ per province. These differences include, for example, different climates and legislation. These differences impact the land-use forms and, in turn, the income generated from land-use forms. The provincial differences are discussed next. This section highlights the differences in the most productive land-use form per province.

6.7.5.1 Gauteng province

Figure 6.3 below depicts the land-use management model for the Gauteng province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

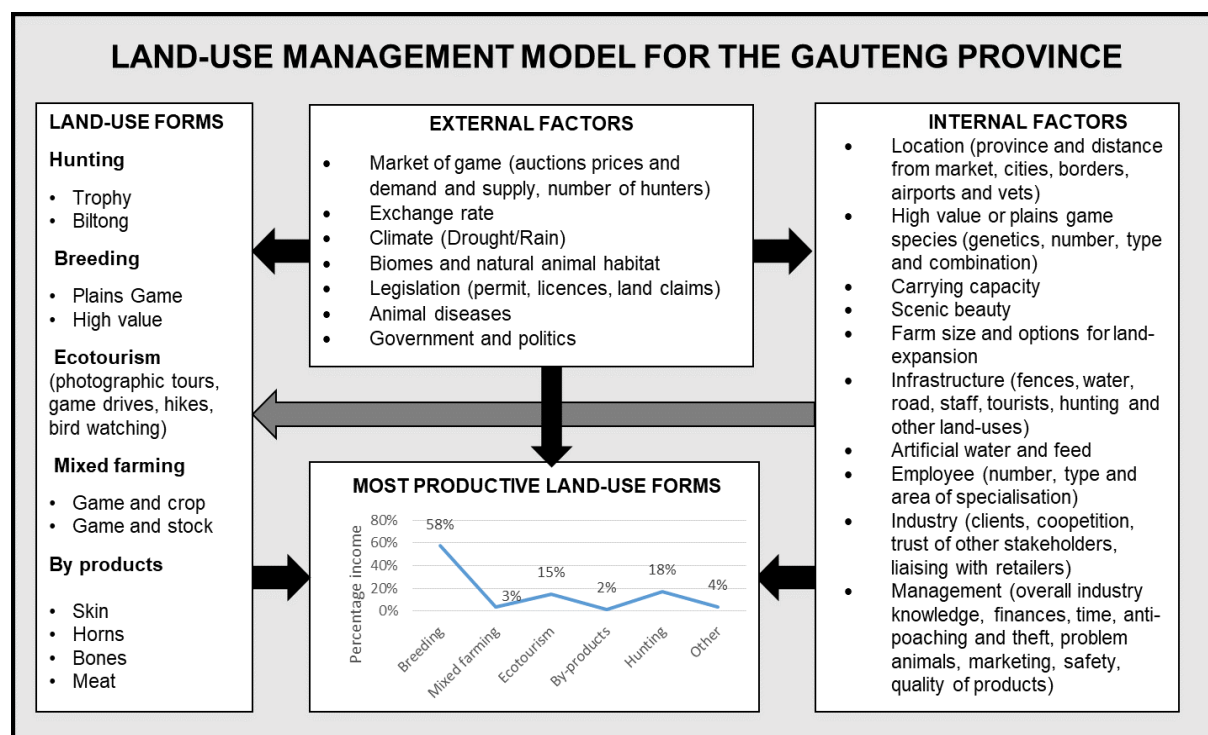


Figure 6.3: Gauteng province's land-use model

In the Gauteng province, by a large margin, breeding generates the highest average income and is viewed as the most productive land-use activity. To a lesser extent, hunting and ecotourism are the second most popular land-use forms and, on a small scale, mixed farming and by-products. Ecotourism, the third most productive land-use activity, generates more than 10% of average income which is more than that for most other provinces. Mixed farming is also of lesser importance than in other provinces where mixed farming falls within the top three most productive land-use forms. Unlike the other provinces, the Gauteng province does not have specific legislation that relates to specific species, except for hunting protocols. Overall, there is also one predominant biome, the Grasslands biome. This differs from the other provinces discussed next that have additional legislation that specifically relates to specific species or specific diseases.

6.7.5.2 Limpopo province

Figure 6.4 below depicts the land-use management model for the Limpopo province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

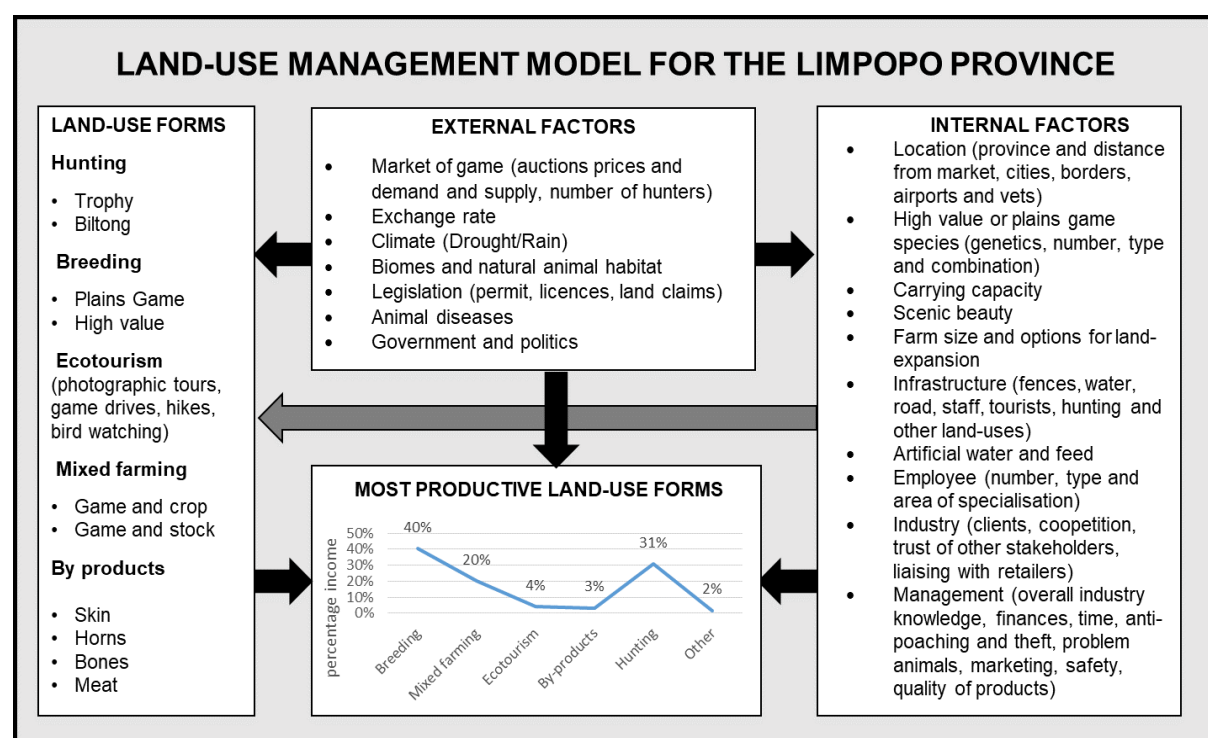


Figure 6.4: Limpopo province's land-use model

The order of the land-use forms from the most popular to the least popular in the Limpopo province is the same as the order as per the national land-use model. This involves breeding and hunting being the most productive land-use forms which is followed by mixed farming, ecotourism and by-products as well as other land-use forms. The low percentage allocated

to the last two land-use forms, ecotourism and by-product, is similar to the percentage allocated in other provinces.

Examples of factors unique to the Limpopo province, and that private wildlife establishment owners should consider, include legislation that related to buffalo and preventing FMD and Corridor or Buffalo disease spreading into areas within the province where disease-free buffalo occur. Legislation also indicates that, in certain geographic areas, blue and black wildebeest are not allowed to be hunted.

6.7.5.3 Mpumalanga province

Figure 6.5 below depicts the land-use management model for the Mpumalanga province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

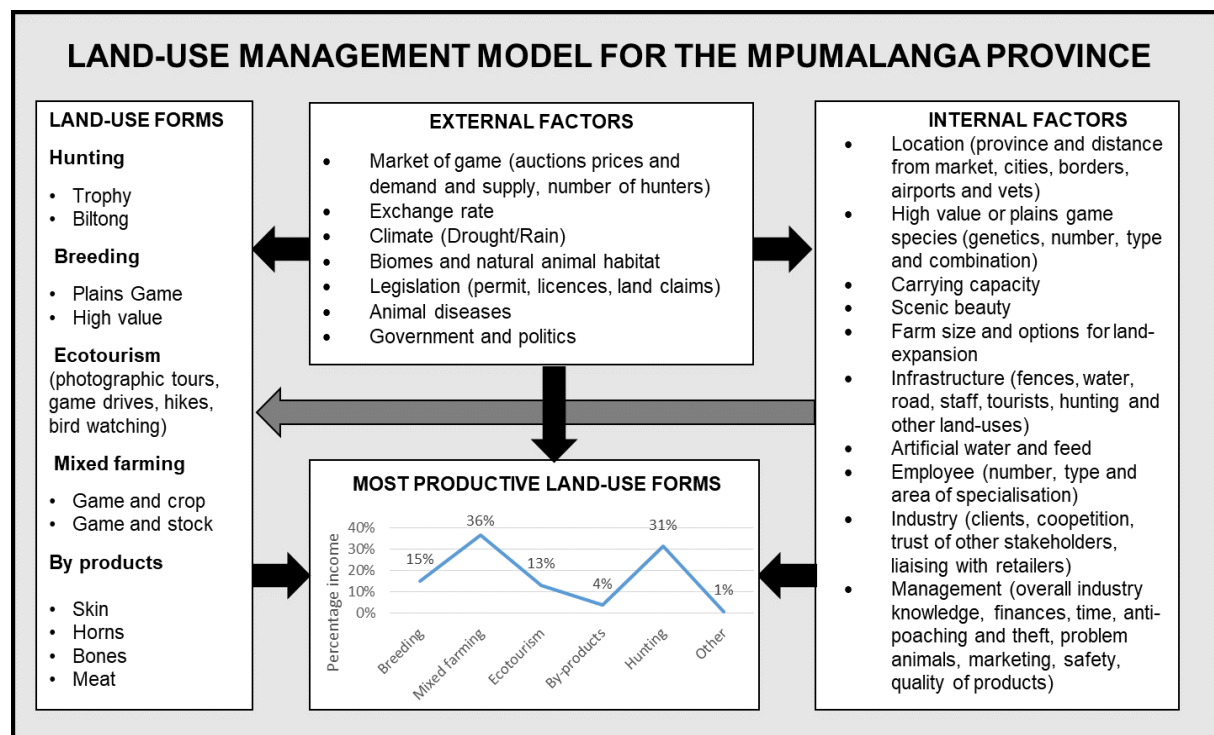


Figure 6.5: Mpumalanga province's land-use model

Mixed farming and hunting are the land-use forms that generate the highest average income and which are the most productive land-use forms in the Mpumalanga province. This, to a lesser extent, is followed by breeding and ecotourism and, on a smaller scale, by-products and other land-use forms. It is only in the Mpumalanga and Western Cape provinces where mixed farming is seen as the most productive land-use activity that generates the highest average income – either because the change to game farming is still in progress or game farming is not the main focus of the operation.

Examples of factors unique to the Mpumalanga province, and that private wildlife establishment owners should consider, include legislation that aims to separate disease and disease-free buffalo – especially buffalo that have FMD. In addition, buffalo in the Mpumalanga province may also suffer from Corridor of Buffalo disease. Lastly, both the Savannah and Grasslands biomes occur in different geographic areas within the Mpumalanga province. Private wildlife establishment owners must be aware of the biome in which their establishment is located and be familiar with climate, vegetation and species that prefer the specific biome.

6.7.5.4 Eastern Cape province

Figure 6.6 below depicts the land-use management model for the Eastern Cape province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

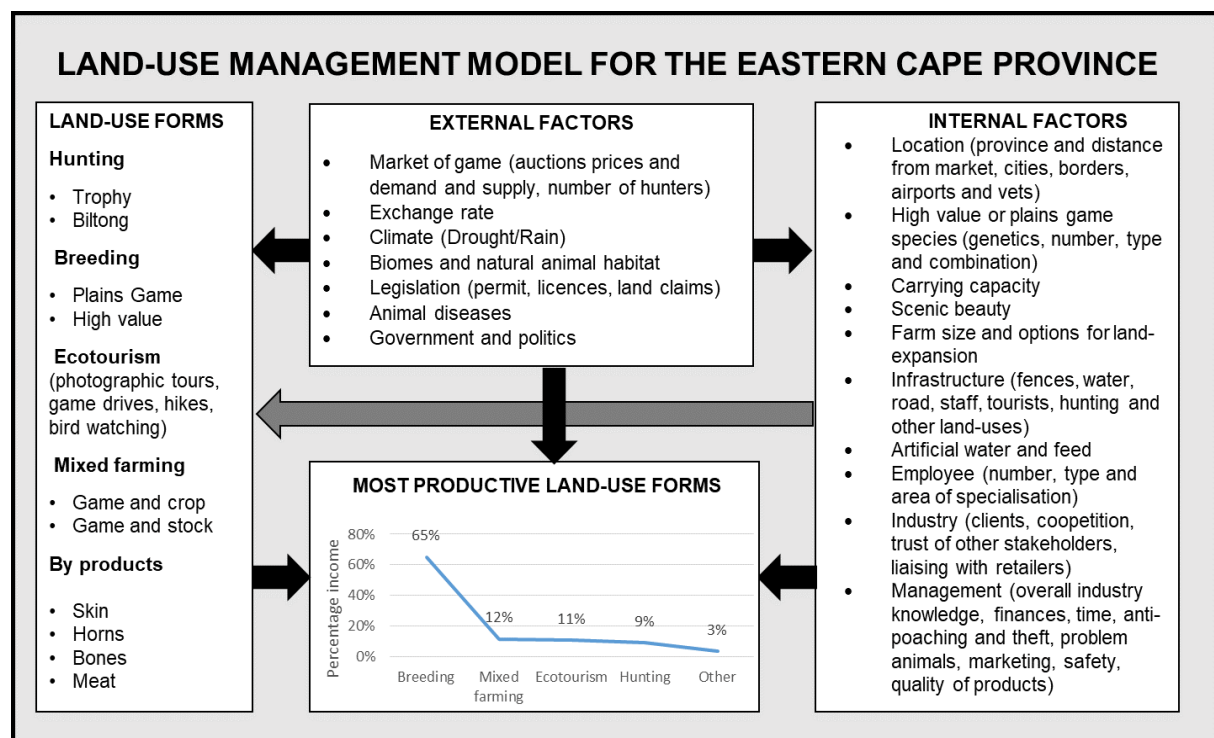


Figure 6.6: Eastern Cape province's land-use model

Breeding generates by far the highest average income which is followed by mixed farming, ecotourism, hunting and other land-use forms. The only other provinces where breeding is seen as the single most predominant land-use activity are the Free State, North West and Gauteng provinces.

Examples of factors unique to the Eastern Cape province, and that private wildlife establishment owners should consider, include blesbok and bontebok legislation that relates to translocation, hunting, permits and hybridisation of the species. A second province-specific factor relates to the biomes. Within the Eastern Cape province there are eight

biomes – all but desert. Thus private wildlife establishment owners must be aware of the biome in which their establishment is located and be familiar with climate, vegetation and species that prefer the specific biome.

6.7.5.5 Western Cape province

Figure 6.7 below depicts the land-use management model for the Western Cape province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

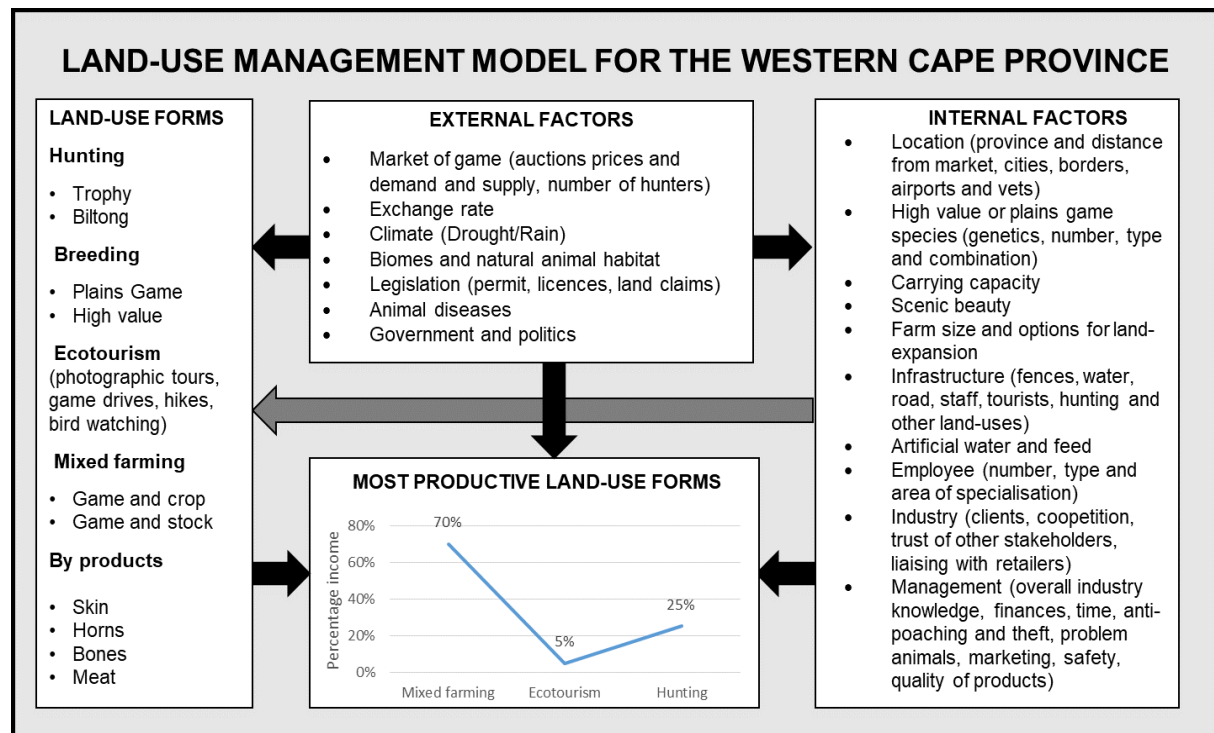


Figure 6.7: Western Cape province

The Western Cape province is the only province that has only three land-use forms that generate income. These are predominantly mixed farming which is followed, to a lesser extent, by hunting and ecotourism. The Western Cape province provides ideal habitat for specific species that are not allowed to be kept in other provinces or that are not able to adapt well in other provinces. Examples are Cape mountain zebra and bontebok. These species are protected by legislation that prevents translocation and hybridisation and indicates fencing regulations.

Examples of factors unique to the Western Cape province, and that private wildlife establishment owners should consider, include legislation that relates to bontebok and blesbok, rhino, black and blue wildebeest Cape mountain zebra and sable and roan that relate to hybridisation, translocation, procedures to follow to own the species and permits and hunting. Lastly, the Fynbos, Succulent Karoo and Nama Karoo biomes occur in different geographic areas within the Western Cape province. Private wildlife establishment owners

must be aware of the biome in which their establishment is located and be familiar with climate, vegetation and species that prefer the specific biome.

6.7.5.6 Northern Cape province

Figure 6.8 below depict the land-use management model for the Northern Cape province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

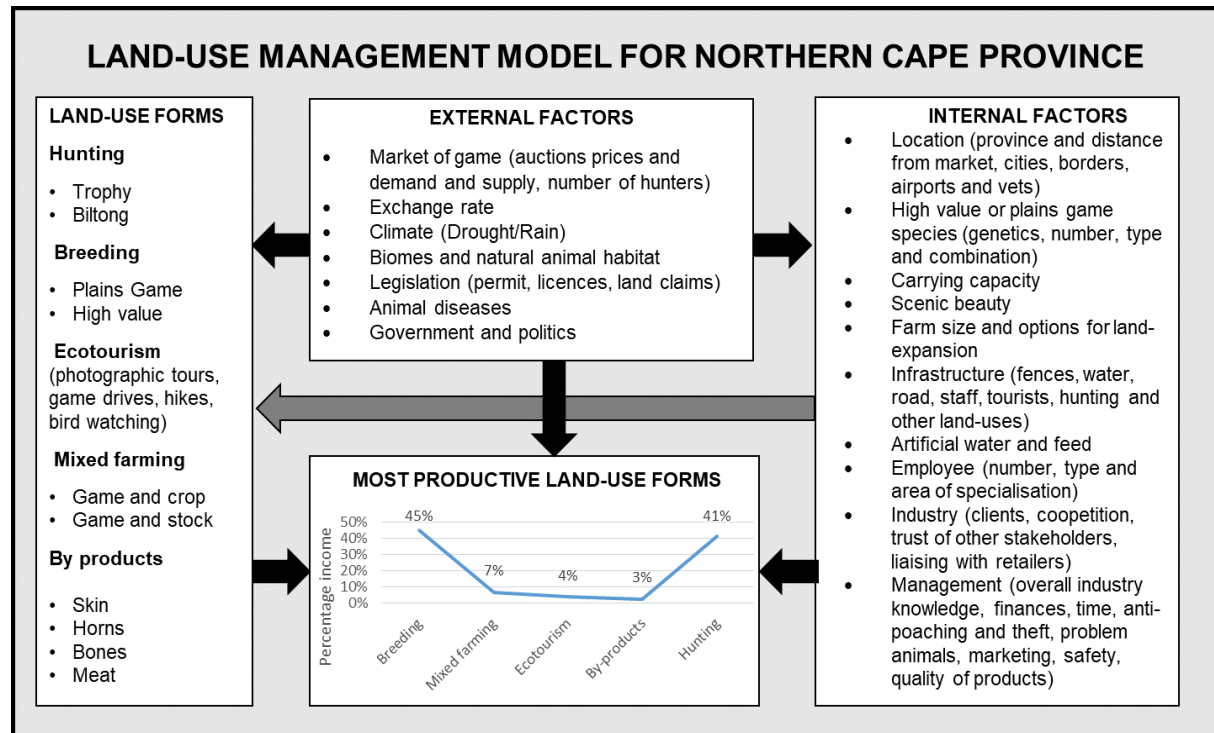


Figure 6.8: Northern Cape province's land-use model

Breeding and hunting generate the highest average income and are the most productive land-use forms. This is followed, to a much lesser extent, by mixed farming, ecotourism and by-products. The order of land-use forms, from most popular to least popular, is similar to those of the Limpopo province and South Africa as a whole.

Examples of factors unique to the Northern Cape province, and that private wildlife establishment owners should consider, include bontebok and blesbok legislation that related to hybridisation and translocation. Another example is the biome in which the private wildlife establishment occurs. The Savannah, Desert, Succulent and Nama Karoo biomes occur in different geographic areas within the Northern Cape province. Private wildlife establishment owners must be aware of the biome in which their establishment is located and be familiar with climate, vegetation and species that prefer the specific biome.

6.7.5.7 North West province

Figure 6.9 below depicts the land-use management model for the North West province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

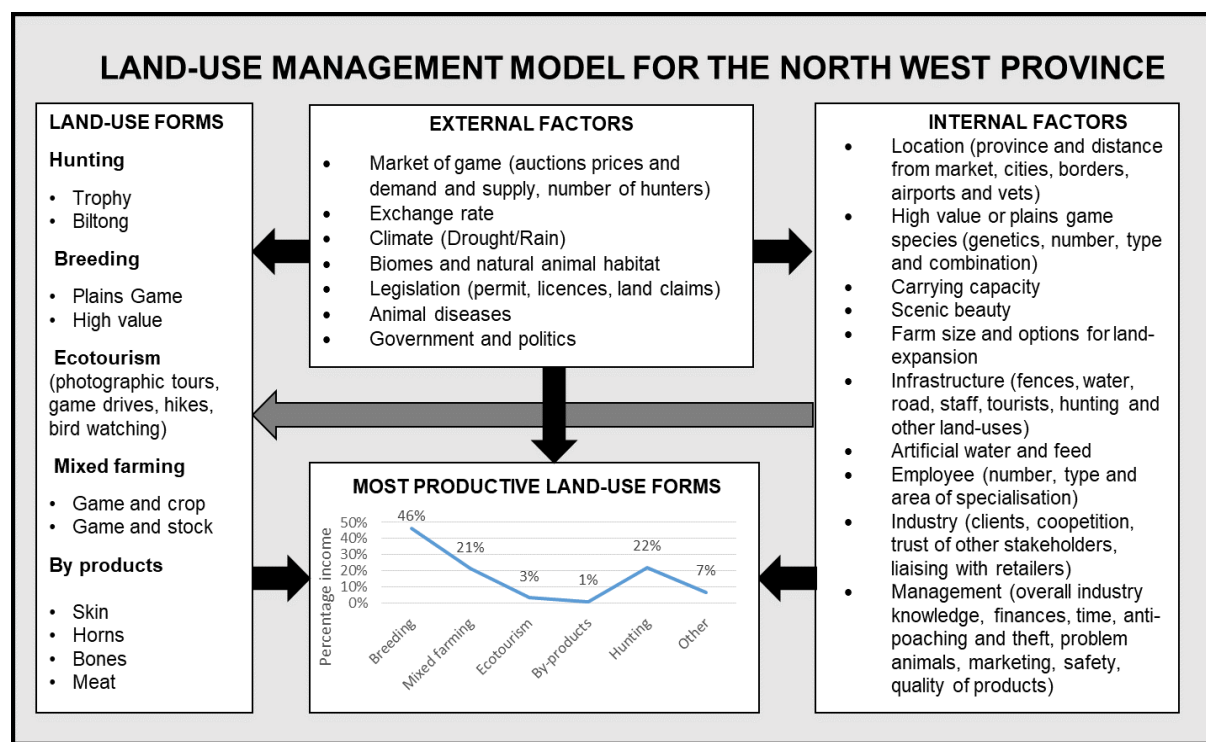


Figure 6.9: North West province's land-use model

Breeding has the highest average income and is followed to a lesser extent by hunting and mixed farming. Ecotourism, by-products and other land-uses are the least productive and generate the least average income.

Examples of factors unique to the North West province, and that private wildlife establishment owners should consider, include legislation that relates to buffalo, predators, black and blue wildebeest, Cape mountain zebra and roan. The legislation aims to control hybridisation, translocation and hunting. In addition both the Savannah and Grasslands biomes occur in different geographic areas within the North West province. Private wildlife establishment owners must be aware of the biome in which their establishment is located and be familiar with climate, vegetation and species that prefer the specific biome.

6.7.5.8 KwaZulu-Natal province

Figure 6.10 below depicts the land-use management model for the KwaZulu-Natal province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

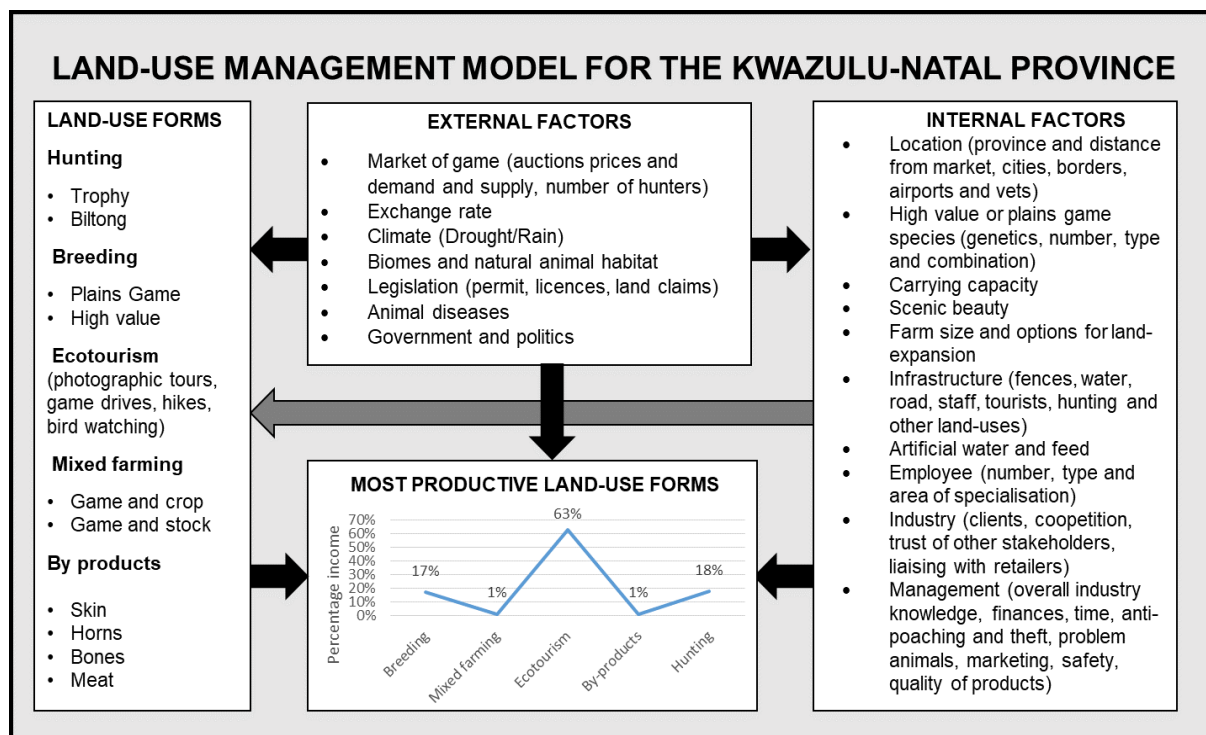


Figure 6.10: KwaZulu-Natal province's land-use model

The KwaZulu-Natal province is the only province that focuses specifically on ecotourism. Ecotourism generates the highest average income and is the most productive land-use activity. This is followed, to a lesser extent, by hunting and breeding. Mixed farming and by-products are the two least productive land-use forms.

Examples of factors unique to the KwaZulu-Natal province, and that private wildlife establishment owners should consider, include legislation that aims to separate disease and disease-free buffalo – especially buffalo that have FMD. Lastly, both the Savannah, IOCB and Grasslands biomes occur in different geographic areas within the KwaZulu-Natal province. Private wildlife establishment owners must be aware of the biome in which their establishment is located and be familiar with climate, vegetation and species that prefer the specific biome.

6.7.5.9 Free State province

Figure 6.11 below depicts the land-use management model for the Free State province. This is followed by a brief description of the most productive land-use forms and examples of some of the factors unique to the province.

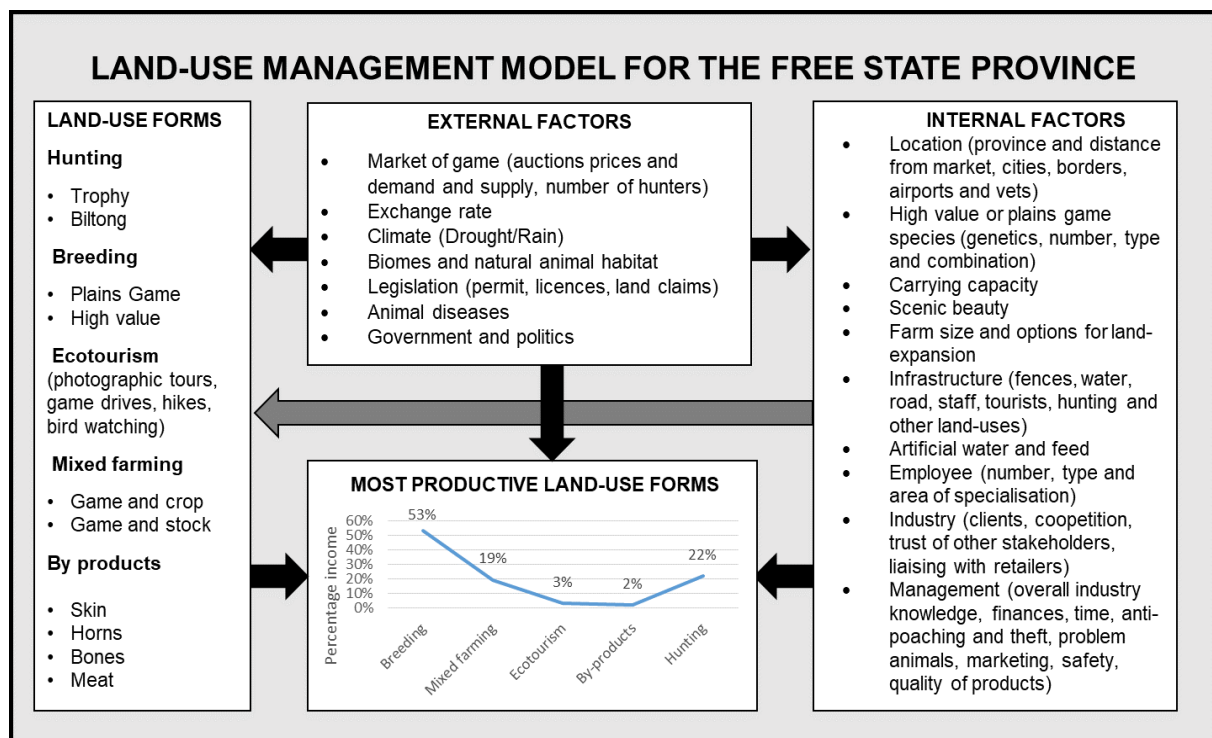


Figure 6.11: Free State province's land-use activity

Breeding has the highest average income and is the most productive land-use activity. This is followed, to a lesser extent, by hunting and mixed farming. Ecotourism and by-products are the two least productive forms.

Examples of factors unique to the Free State province, and that private wildlife establishment owners should consider, include legislation that relates to the translocation and hybridisation of black and blue wildebeest and bontebok and blesbok.

6.8 PERSONAL JOURNEY

I used to visit the Addo Elephant National Park as a child. I enjoyed the atmosphere and experiences on multiple occasions with my family. The feeling experienced when watching wild animals was always something I enjoyed. In high school, we travelled to Namibia, Botswana and Zimbabwe on holidays. Later I visited Zambia, Tanzania, Kenya and Uganda and, for the first time, became aware of different environments in which wildlife can exist. The natural environment and wildlife experienced there instilled an even deeper love for wildlife. As a student, I was appointed as a lodge manager on a private game reserve. This was my first contact with the private wildlife industry. Although my duties involved managing a lodge, I realised the importance of knowledge of the animals and their habitat as well as of managing the game reserve.

Throughout these experiences of wildlife, I never expanded my knowledge on the operation and management of wildlife. I also never considered gaining additional knowledge as my

areas of interest were different. However, I was provided with the opportunity to conduct research, as part of my PhD, on the private wildlife industry. Unsure of exactly what to expect, I started to read and conduct research.

The literature study made me realise the amount of information that exists on the topic. The link between the four pillars and the factors that impact the four pillars started to intrigue me increasingly as I continued to conduct research. Also, the amount of information that private wildlife establishment owners must consider is phenomenal. The legislation, climate, infrastructure, the economy, government, the natural environment, other role players in the industry and managerial aspects all have numerous considerations that must be researched and analysed before land-use decisions can be made.

Upon conducting primary research and speaking to the wildlife establishment owners, I realised the knowledge and passion of the private wildlife establishment owners. They knew the extent to which their pillars contribute to the success of their operations, and they knew their challenges, past and future investments and the aspects that impact their wildlife operation. It was also intriguing to see how the private wildlife establishment owners that have the same species or own property in the same districts manage their private wildlife establishments differently, experience different challenges and make different investments.

Throughout the process, I learned to trust the opinions of those individuals that know the private wildlife industry. This stems from existing literature, my promoter and the interviewees. The literature and these individuals have helped me to create a thorough picture of the private wildlife industry – how it came to be, as it exists currently and how it will probably change and develop in the future.

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Appendix A: Research instrument



Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222

TREES

Tel: 0829269240

Email: 10219382@nwu.ac.za

2 February 2017

Good day.

LAND-USE MODEL

I am conducting research on the private game farm industry under the supervision of Prof Peet van der Merwe at North-West University, Potchefstroom Campus. Part of the research will be the collection of primary data which involves gaining information on land-use from private game farms in the nine provinces of South Africa. Private game farms are influenced by different variables (location, climate, biomes, hunting regulations and legislation). The aim of the research study is to combine these province-specific variables with information on the current land-uses practised by private game farmers to develop a land-use management model. Such a land-use management model will benefit new and emerging private game farm owners as it will stipulate the different variables and most sustainable and profitable combination of land-use activities in one source. Primary research consists of a questionnaire that game farmers complete voluntarily with regards to their own land-use activities. I appreciate your participation in this research study and thank you for taking the time to read this information.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Woudi von Solms'.

Woudi von Solms

LAND-USE SURVEY

1) Please indicate where the farm/game reserve is situated.

Province	
District	
Biome	

2) Why did you choose this specific area for your operation (example climate, location, proximity to urban areas)?

3) Type of business

Sole proprietor	
Close corporation (CC)	
Trust	
PTY	
Other	

4) What is the current size of your farm (in ha)_____?

5) How many species do you have (give a number)

_____?

6) Which of the following species and the number thereof do you have?

Species	Mark	No		Mark	No		Mark	No
Aardvark			Hippo			Sable		
Blesbok			Sharp's grysbok			Springbok		
Blue wildebeest			Impala			Steenbok		
Black wildebeest			Klipspringer			Suni		
Bontebok			Kudu			Tsessebe		
Buffalo			Leopard			Waterbuck		
Bush pig			Lechwe			Zebra		
Bushbuck			Lion			Zebra (Mountain)		
Crocodile			Nyala			Other (Specify)		
Duiker (common)			Oribi					
Duiker (blue)			Ostrich					
Duiker (red)			Reedbuck					
Eland			Reedbuck mountain					
Elephant			Red hartebeest					
Gemsbok			Rhino (black)					
Giraffe			Rhino (white)					
Grey rhebuck			Roan					

7) How many years have you been operational _____?

8) Total number of employees who are employed by the operation. Please provide us with a breakdown of employees per category as listed below.

Category	Permanent	Part time	Male/Female
Technical (game fencing, fire burns, repair of equipment)			
Hospitality (tourism)			
Marketing			
Housekeeping			
Management			
Specialised (Trackers, PH, Warden)			
Security			
Taxidermy			
Abattoir			
Other (Please indicate)			

9) Please indicate the percentage of land-use regarding the total size of the land for the following.

Activity	Total of 100%	%
Breeding high value species (Roan/sable/colour variants, rhino, buffalo) %	- Controlled environments (Intensive) - Semi-extensive (with/without controlled environments) - Extensive (with/without controlled environments)	 _____% _____% _____%
Plains game (springbok, gemsbok, blesbok) %	- Controlled environments (Intensive) - Semi-extensive (with/without controlled environments) - Extensive (with/without controlled environments)	 _____% _____% _____%
Add-up to 100%		

10) Please indicate the percentage of total production output regarding the following businesses conducted on the land.

Business form	%
Mixed farming (game/stock)	
Mixed farming (Game/crop)	
Ecotourism	
Breeding	
Meat production	
Hunting: - Biltong - Trophy	Biltong____? Trophy____?
Other specify	
Add up to 100%	

11) Any other value-adding activities, for example feeding mixtures, curios, conferences etc? If yes, please name them. Hiking, biking, 4x4, and other adventure/nature based activities.

12) Based on total income generated by your operations, please give a percentage breakdown in relation to the following?

Income generating aspects	Must add up to 100%
Breeding	
Please give a breakdown of the following regarding percentage given above	
- High value/colour variants - Plains game	
Mixed farming (game/stock)	
Mixed farming (game/crop)	
Ecotourism	
Meat production	
Nature based adventure activities	
Hunting	
Fishing	
By-products (skin, bones, horns)	
Taxidermy	
Value-adding products (conference/wedding)	
Other	

13) What do you think can improve your return on investment (land/animals) in your current operations?

14) What was the total capital investment until now?

Amount invested	Land	Animals	Infrastructure
R1 – R500 000			
R500 001 – R1 000 000			
R1 000 001 – R2 000 000			
R2 000 001 – R3 000 000			
R3 000 001 – R5 000 000			
R5 000 001 – R10 000 000			
R10 000 001 – R20 000 000			
R20 000 001 - R30 000 001			
R30 000 001 +			

15) During the last five years, what was your biggest capital investment?

16) Based on the total capital layout of your operation, please give a percentage breakdown of the expenditure of cost regarding the following.

Expenditure	Must add up to 100%
Breeding	
Please give a breakdown of the following regarding percentage given above • High value/colour variants • Plains game	
Mixed farming (game/stock)	
Mixed farming (game/crop)	
Ecotourism	
Meat production	
Nature based adventure activities	
Hunting	
Fishing	
By-products (skin, bones, horns)	
Taxidermy	
Value-adding products (conference/wedding)	
Other	

17) What are currently the biggest challenges of the private wildlife industry?

18) Are there any areas/facets of your operations that you would like to expand? Please name them. Motivate your answer.

19) Any other suggestions?

Thank you

Appendix B: Plagiarism report

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