"Trophy Hunting Anxiety at Sengwa in Retrospect Now and the Future"

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Analysis of trends on trophy quality of African elephant, lion, buffalo and stakeholders perceptions in Sengwa Wildlife Research Area, Zimbabwe from 2003 to 2013

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ABSTRACT

Trophy quality (size) coupled with stakeholders' perceptions on elephant (*Loxodonta africana*), lion *(Panthera leo*) and buffalo (*Syncerus caffer*) in Sengwa Wildlife Research Area (SWRA), Zimbabwe were analysed so as to determine the trends for the period 2003 to 2013. Trophy quality data were obtained from hunting records kept at station level in SWRA and Hunting Return Forms (TR2) database kept at Zimbabwe Parks and Wildlife Management Authority headquarters. Thirty key stakeholders' perceptions were determined using a questionnaire survey consisting of both closed and open-ended questions. The stakeholders interviewed were Safari Operators, Professional Hunters and Wildlife Rangers. The questionnaires were aimed at determining whether these perceptions were in line with the trophy quality trends observed from scientific data synthesized from the records. A One Way non-parametric analysis of variance *(Kruskal Wallis)* test, of the trophy quality data showed that from 2003 to 2013, there were significant annual variations for elephant and buffalo trophy quality ($p < 0.01$), while for lion, the variations were not significantly different ($p > 0.395$). The perceptions of stakeholders with more than four years hunting experience in SWRA corroborated the observed changes in trophy quality obtained from field measurements. The results revealed that elephant and buffalo trophy quality has significantly declined over the years. The study recommends that, where quantitative data on trophy quality are unavailable, information from experienced hunters can provide a useful insight on trophy quality trends which can help to make robust decision making processes for sustainable utilisation through consumptive tourism.

Key words: Trophy quality, Safari Operator, Perceptions, Sengwa Wildlife Research Area

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INTRODUCTION

Trophy hunting, also known as sport hunting, game hunting and safari hunting, involves the practice of pursuing any living organism usually wildlife or feral animals for sport or recreation (Lovelock, 2008). Trophy hunting is the selective hunting of wild game animals and parts of the animal may be kept as hunting trophy or memorial (Barnett and Patterson, 2005). A hunting trophy is a horn, ivory, tusk or skull prepared from the body of a wild animal killed by a hunter and is kept as a souvenir of the successful hunting expedition (Barnett and Patterson, 2005).

Trophy hunting is now a major industry in Africa generating substantial revenue from wildlife over vast areas (Baldus and Cauldwell, 2004) hence continuous monitoring and assessment of trophy size and quotas is just inevitable (Grobbelaar and Masulani, 2003). It is also increasingly becoming the engine that is driving many country's community-based programs, especially in Zimbabwe, Botswana and Namibia (Chimuti *et al*., 2000). Therefore, analysing trophy quality trend is vital for effective quota setting which is the cornerstone for sustainable trophy hunting (Baker, 1997).

There has been an increasing concern about the possible long-term effects of trophy hunting in Africa (Darimont *et al*., 2009). Such effects have been linked to strong selection pressure on the morphological traits exhibited by the animals but no general consensus has been reached because of lack of information (von-Brandis and Reilly, 2007). Adams (2004) propounded that sport hunting is often considered as a necessary part of wildlife protection, management and has been the driving force in conservation since the early 20th century but there is need for continuous monitoring to ensure its effectiveness because without monitoring, it can also lead to wild game population declines.

In Zimbabwe, trophy hunting is a monitored form of wildlife utilisation which is controlled through the participatory quota setting process system and is subjected to very strict legal and scientific requirements guided by the Parks and Wildlife Act (Chapter 20:14) (ZPWMA, 2013) *Unpublished report*. Although hunting in Zimbabwe is a well-developed industry, trophy quality trends have been little studied hence lack of information to make informed management decisions. Henceforth, the focus in of this paper was to analyse trophy size trends of elephant, buffalo and lion from 2003 to 2013 in SWRA, to establish stakeholders' perceptions on trophy size of elephant, buffalo and lion in SWRA and to determine whether stakeholders' perceptions on trophy size were in line with the observed trends from quantitative data.

Sengwa Wildlife Research Area annual report for the year 2013 indicated that, there was a decline in trophy size of elephant and buffalo (Moyo, 2013) *Unpublished report*. The trophies were less than satisfactory as the average trophy sizes were below the recommended Safari Club International (SCI) and Rowland Ward (RW) average size. Although, several studies have been conducted in SWRA, few studies have been

conducted on trophy quality trends coupled with stakeholders' perception on big game animals since the inception of hunting in in the year 2003, yet these are key species in the hunting industry hence there is lack of information on which to base informed management decisions on trophy hunting. Therefore this study aimed at analysing trophy quality trends and stakeholders' perceptions on elephant, lion and buffalo in SWRA for the period 2003 to 2013.

Objectives

1. To analyse trophy size trends of elephant, buffalo and lion from 2003 to 2013 in SWRA.
2. To establish stakeholders' perceptions of trophy size of elephant, buffalo and lion in SWRA.
3. To determine whether stakeholders' perceptions of trophy size were in line with the observed trends from quantitative data.

MATERIAL AND METHODS

Study Site and Population status

Sengwa Wildlife Research Area (SWRA) is situated in north-western Zimbabwe, about 100 km south of Lake Kariba (Tafangenyasha, 2000). It covers approximately 373km² and is situated about 96 km west of Gokwe. It lies between 28° 03′ and 28° 20′E and 18°0′and 18°13′S.The 2013 population status for elephant were 1 015, buffalo 915 and lion 13 (Moyo, 2013) *Unpublished report*.

Research design

Purposive random design was used in the study. The selected animal species (elephant, buffalo and lion) were chosen on their proven economic importance in the hunting industry (high prices obtained for their trophies) and due to their iconic status as members of the 'big-five'. Key stakeholders (Safari Operators, Professional Hunters and Wildlife Rangers) were purposively selected due to their knowledge in the hunting industry. The stakeholders were further randomly selected during administration of the questionnaires.

Data collection methods

The study used three techniques to collect data which included review of secondary sources on trophy size (quantitative), key informant interviews and questionnaires (qualitative). This logic supports a well-known qualitative research technique called "triangulation". Triangulation was used to cross check and at the same time increase the strength of the inquiry by compensating any existing loopholes that may result due to the use of one particular method (Oka and Shaw, 2000).

Trophy quality data

Secondary sources of data were used since there is a systematic way of recording all hunts taking place in SWRA ever since the inception of hunting in the year 2003. Information on trophy size is properly recorded and documented. Data on trophy size were obtained from hunting records kept at station level in SWRA and Hunting Return Forms (TR2) database kept at ZPWMA headquarters. Trophy size measurements were conducted using the (Safari Club International) SCI for (elephant and lion) and the Rowland Ward method for (buffalo). The data were recorded in inches for buffalo and lion but converted to centimetres using a scale of (1 inch = 2.54 cm). For elephant the measurements were recorded in pounds but converted to kilograms using a scale (1 pound = 0.4536 kg). The following variables were recorded for each species, year, trophy size, allocated and utilised quota per species from the year 2003 to 2013 (Appendix 1).

Questionnaires and interviews

Questionnaires consisting of a list of pre-set questions (closed and open ended) were used to solicit for views on the key stakeholders' perceptions on trophy quality of elephant, buffalo and lion in SWRA (Appendix 2). Stakeholders in the hunting industry who were interviewed included Professional Hunters (PH), Wildlife Rangers (WR) and Safari Operators (SO). Key stakeholders (PH, WR and SO) were purposively selected due to their knowledge in the hunting industry. The stakeholders were further randomly selected during administration of the questionnaires survey, which was personally administered in English. Time was given to explain the purpose of the survey and any clarification were provided. All respondents were assured of anonymity to increase chances of providing reliable information.

Data Analysis

Data on trophy quality were captured in Microsoft Excel and later exported to Statistix version 10 (Analytical Software, 2012) were it was analysed. Data were first tested for normality using the *Shapiro–Wilk* test for normality. Data were not normally distributed because the significant value of the *Shapiro-wilk* test was ($p < 0.05$) for all the three high value trophy animals. Therefore, an attempt was made to transform data to normality using the Log-transformation and Squareroot transformation. However, the Log-transformation and Squareroot transformation were not successful in transforming the data to meet the conditions of normality.

Since the data were not normally distributed, it was necessary to identify the appropriate test based on normality. Therefore, A One Way non-parametric analysis of variance *(Kruskal Wallis)* test, was used to test for significant difference in trophy sizes across the years from 2003 to 2013 per each species. This test was chosen specifically because it is a non-parametric test that can analyse more than two independent variables. The results from the test revealed that, there were significant

annual variations for elephant and buffalo trophy quality, while for lion the variations were not significantly different (p >0.05).

It was therefore necessary to establish which pairs were significantly different across the years as per species (elephant and buffalo). For this reason, *Tamhane post hoc* test was used since it does not assume equality of variance in the test variables. The *Tumhane post hoc* test was conducted particularly to identify the years (pairs) with significant difference for elephant and buffalo. In all the scenarios, statistical significance was inferred to at alpha level of 0.05. Using the confidence intervals of each proportion it was later possible to establish the pairs (years) that were significantly different.

Data presentation for the *Tamhane post-hoc* test on elephant and buffalo were executed in Microsoft Excel and the year (pairs) with significant difference were shown by the different superscript letter. Allocated and utilised quotas as well as questionnaire data on key stakeholders' perceptions on trophy quality for the three high value trophy animals were coded and presented on graphs and tables in Microsoft Excel.

RESULTS

Table 1: *Kruskal Wallis* test on trophy size of elephant, buffalo and lion from 2003 to 2013 in SWRA.

Animals	***d.f.***	***Sig/P_value***
Elephant	10	0.001
Buffalo	10	0.001
Lion	10	0.395

The *Kruskal Wallis* test revealed that from 2003 to 2013, there were significant annual variations for elephant and buffalo trophy size ($p < 0.05$), while for lion, the variations were not significantly different ($p > 0.05$).

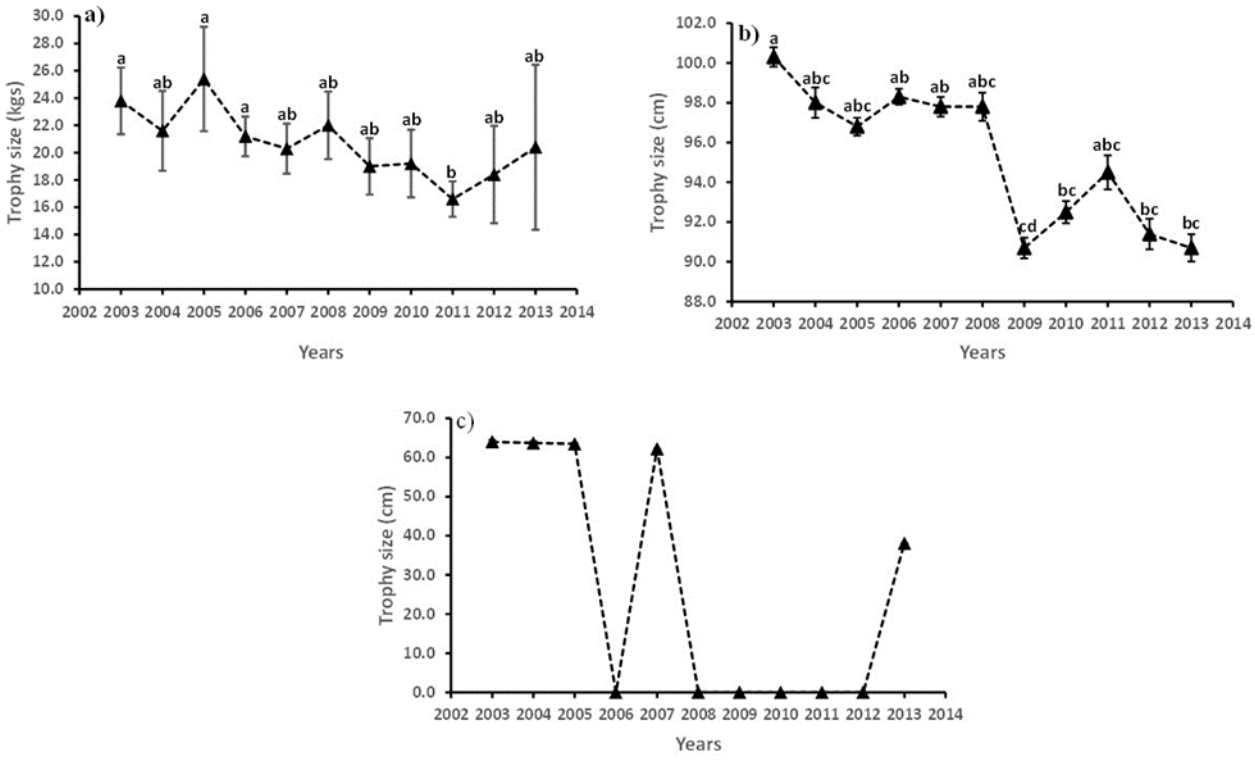

Figure 1: Mean annual trophy size trends for **a)** elephant, **b)** buffalo and **c)** lion from the year 2003 to 2013 in SWRA displaying years with significant difference for elephant and buffalo after a *Tamhane post-hoc* test as shown by different superscript letter.

a) Elephant trophy size trend indicated a downward pattern since the inception of hunting in the year 2003. For the years 2012 and 2013 the trend shows a positive increase in mean annual trophy size. **b)** Buffalo trophy size trend displays a decline in mean annual trophy quality with 2009 showing the least mean annual trophy size. **c)** Lion mean annual trophy size has been gradually declining from the year 2003 to 2005. However, the years 2006, 2008 to 2011 recorded no hunts, with the exception of the year 2012 allocated no lion quota.

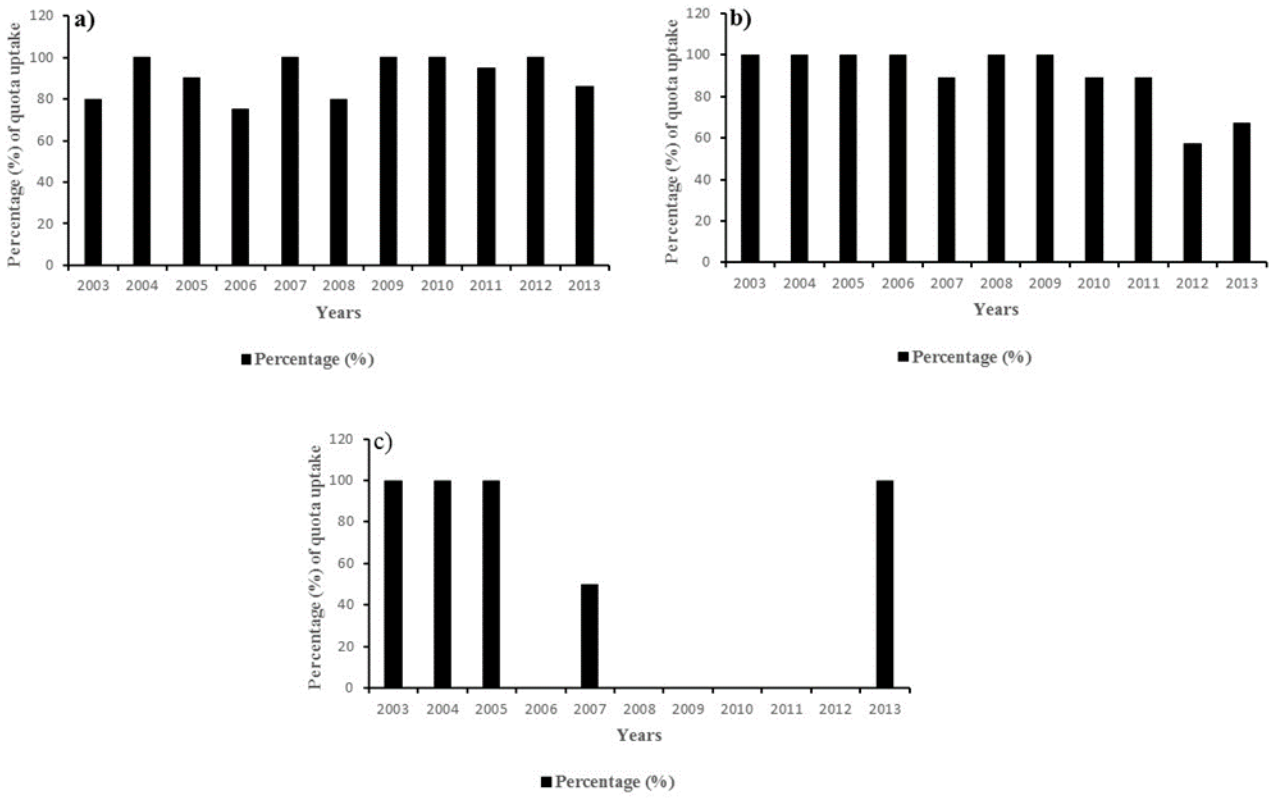

Figure 2: Percentage of quota uptake for **a)** elephant, **b)** buffalo and **c)** lion from the year 2003 to 2013 in SWRA.

a) Percentage quota uptake for elephant ranged from 57% to 100% (Figure 3a). The years 2003 to 2006, 2008 and 2009 recorded 100% quota uptake. The average quota uptake for elephant were 90% for the study period. **b)** Buffalo percentage quota uptake ranged from 75% and 100% for the study period (Figure 3b). The years 2004, 2007, 2009, 2010 and 2012 recorded 100% quota utilisation. The average quota uptake for buffalo were 91% **c)** Lion percentage quota uptake ranged from 0 and 100% in the study period (Figure 3c). For the years 2006, 2008 to 2011 there were no hunts with the exception of the year 2012 allocated no lion quota. The average quota uptake for lion were 45% for the study period.

A perceptions map of respondents targeted a wide variety of occupations. The interviewed respondents consisted of 56% Wildlife Rangers, 40% Professional Hunters and 4% Safari Operator. An examination of respondents' experience in the hunting industry of SWRA varied from one (1) year to eight (8) years indicating a variety of conceptual opinions.

Table 2: Respondents satisfaction with current trophy quality

Response	Elephant	buffalo	lion
	Percentage (%)	Percentage (%)	Percentage (%)
No	93	93	36
Yes	7	7	20
Nil returns	-	-	44

About 93% of the respondents raised a concern that they were not satisfied with the current trophy quality for elephant and buffalo. For lion, only 36% of the respondents indicated that there were not satisfied (table 2).

Table 3: Percentage of respondents' perceptions on trophy quality status

Response	Elephant	buffalo	Lion
	Percentage (%)	Percentage (%)	Percentage (%)
Decline	100	93	20
Increase	-	7	-
No change	-	-	30
Nil returns	-	-	50

All the respondents (100%) agreed that, elephant trophy quality was on the decline. For buffalo, 93% of the respondents indicated a decline in trophy quality and 7% reported that, there was no change in trophy quality. For lion trophy quality, 50% of the respondents did not provide any answers, only 20% indicated that there was a decline and 30% indicated that there was no change in lion trophy quality (table 3).

Table 4: Respondents' perceptions on perceived factors contributing to decline in trophy quality

Respondents perceptions on factors contributing to changes in trophy quality	Percentage (%)
Poaching	73
Trophy hunting	14
Seasonal migration	6
Habitat fragmentation	4
Habitat loss	3

The majority of the respondents (87%) attributed the decline in trophy quality to poaching and trophy hunting (table 4).

Table 5: Percentage of respondents' perceptions on types of poaching

Response	**Elephant**	**buffalo**	**Lion**
	Percentage	**Percentage**	**Percentage**
Commercial	80	3	7
Subsistence	-	80	-
Commercial/ subsistence	20	7	-
Nil returns	-	10	93

Table 5 revealed that, about 80% of the respondents identified commercial poaching of elephant as the major factor causing trophy quality decline. For, buffalo about 80% of the respondents identified subsistence poaching as a factor negatively impacting trophy quality, whilst only 7% of the respondents indicated that commercial poaching of lion is contributing to trophy quality decline.

About 80% of the respondents' shared the perception that Problem Animal Control (PAC) and Human/Wildlife Conflict (HWC) were also factors to consider contributing to the decline in trophy quality of elephant and buffalo.

DISCUSSION

The significant difference in trophy quality for elephant and buffalo as revealed by the test can be attributed to strong hunting selection pressure of certain qualities or morphological traits exhibited by the trophy animals. Crosmary *et al*, (2013) noted that, hunters preferentially harvest older bulls because they generally have exceptional trophy quality than younger ones. Therefore species exposed to higher hunting pressure and higher trophy selectivity such as elephant and buffalo are more likely to experience a decrease in trophy quality. A decrease in trophy size may not only be detrimental to the viability of harvested trophy animals but also to the sustainability of trophy hunting as a conservation tool (Crosmary *et al*, 2013).

The African elephant mean annual trophy quality trend showed a downward pattern from 2003 to 2013. This can be attributed to hunting as a disturbance factor, thus from the inception of hunting, elephants were adjusting to the disturbance until 2011 revealing significant difference across the years. Hunting as a disturbance factor exerts remarkable interference on the hunted populations especially on spatial behaviour hence some animals may be forced to "temporarily or permanently" abandon their home-range as a reaction to the disturbance (Allendorf and Hardd,

2009). Therefore, mature elephants of quality trophy with experience of safer places such as Chizarira where hunting is not conducted might have migrated to such areas leaving behind young elephant bulls of low trophy quality.

The results for buffalo mean annual trophy quality showed significant annual variance across the years. Therefore, it can be argued that from the onset of hunting in the year 2003 there was a huge preference for large pounders since hunters tend to be selective for large individual game animals as revealed by high trophy quality during the initial years of hunting in SWRA. However, by selecting animals with the largest trophy it bears an impact on sustainable wildlife management because of targeting heritable traits (Coltman *et al*., 2003). This phenomenon usually results in scarcity of the most preferable buffaloes of quality trophies, causing gradual decline in trophy quality leading to significant difference across the years if long term monitoring is not implemented. Garel *et al*, (2007) noted that, sport hunting is one of the most pervasive and potentially intrusive human activity that affects wild game population if unmonitored.

Lion trophy quality were gradually declining from 2003 to 2007 but was above the average 23 inches (58.4 cm) for the SCI unit. (Grobbelaar and Masulani, 2003) noted that lion populations are sensitive to hunting hence they are easily affected and this may cause undesirable changes over a short period of time. Lion populations are more sensitive due to social disruption due to the potential for infanticide by incoming males following the removal of pride males. Riggio *et al*, (2012) states that, lion have declined over the last century and particularly in recent decades. Amongst other potential threats the effect of trophy hunting on lions is controversial as it is said to confer both positive and negative impacts which can lead to population and trophy quality decline.

The results revealed that SWRA may be populated by immature low value trophy animals in the long term if measures are not put in place to improve the supply site of trophy quality animals especially for elephants and buffaloes. More valuable trophy animals such as elephant, buffalo, lion, leopard and sable require special attention because they may be exposed to higher hunting pressure hence more likely to experience a decrease in trophy quality (Crosmary *et al*, 2013). The decline in trophy quality may potentially affect income for the hunting industry if hunters choose to travel to areas where trophy quality is attractive (Crosmary *et al*, 2013) hence this may create little or no impetus to conserve wildlife species thereby open the door for poaching.

Fixed Hunting Quotas (FHQ) can also cause trophy quality dynamics and in most cases decline (Baker, 1997). The decline in trophy quality leading to the downward trend for elephant and buffalo can also be attributed to fixed allocated hunting quotas from 2005 to 2011 for elephant as well as from 2003, 2005 to 2011 for buffalo. Lindsey *et al*, (2013) noted that, fixed quotas encourage over harvesting of trophy

animals hence lower population density and alter trophy quality. Baker (1997) states that, establishment of quotas which are not sustainable and accurate may contribute negatively to trophy quality and harvested populations hence causing trophy hunting to be detrimental to wildlife conservation than beneficial.

The respondents attributed the decline in trophy quality to anthropogenic factors mainly poaching and trophy hunting. Seasonal migration, habitat fragmentation and habitat loss were viewed as minor contributory factors to trophy quality decline. High Poaching Pressure (HPP) was identified as the major factor causing trophy quality decline. Poaching of elephant was identified as largely driven by external markets (commercial poaching) whilst for buffalo it was seen as being driven by internal factors including illegal bush-meat trade (subsistence poaching).

The respondents during the questionnaire survey also identified habitat fragmentation as an important factor affecting trophy quality. Elephant and lion need larger home ranges than any other sympatric terrestrial mammals, as a result they are the first to be affected and eliminated by human encroachment (Disteguno, 2004). The human population in Sengwa is growing rapidly hence a key threat to wildlife conservation include competition for land.

Problem Animal Control (PAC) is also another factor which was identified as affecting trophy quality. The response to PAC usually does not discriminate mature from immature animals due to the need to eliminate the problem at hand. Problem Animal Control off-takes often results in large bulls being shot as they may be the predominant crop raiders (Grobbelaar and Masulani, 2003). About 80% of the respondents were of the view that PAC is an issue of concern affecting trophy quality of elephant and buffalo. An increase in agricultural activities by the local communities living on the edge (periphery) of SWRA usually attracts wild animals which cause crop damage, human injuries and in some cases human and livestock loss thus Human and Wildlife Conflict (HWC).

Lack of long-term security of tenure over many hunting concessions has prompted unsustainable over-hunting of certain lucrative species, resulting in inferior trophy quality animals usually in state and communal land concession areas (Chimuti *et al*., 2000). One of the Safari Operators who is also a Professional Hunter at SWRA recommended that, Safari Operators should be given hunting leases for ten years with options for roll-over for further five to ten years as this encourages long term attitudes to wildlife management and conservation because shorter duration of leases usually results in unsustainable trophy hunting

The results of the study during the questionnaire survey revealed that, the perceptions of stakeholders with more than four years hunting experience in SWRA corroborated the observed variations in trophy quality of elephant and buffalo obtained from field measurements.

CONCLUSION

The results of the study revealed a significant variance for elephant and buffalo trophy quality per species, while for lion the variations were not significantly different. The hypothesis that there is no significant difference in the trophy quality of elephant, buffalo and lion from 2003 to 2013 in SWRA per species is therefore rejected and accept the alternative hypothesis, whilst for lion the null hypothesis is retained. The perceptions of stakeholders with more than four years hunting experience in SWRA corroborated the observed changes in trophy quality obtained from field measurements. Therefore, where quantitative data on trophy quality are unavailable, information from experienced hunters can provide a useful insight on trophy quality trends.

RECOMMENDATIONS

Wildlife managers at SWRA should continue measuring and analysing trophy quality trends because such data is essential for decision making processes to attain sustainable utilisation of wildlife resources through consumptive tourism. There is need to regularly undertake population estimates of the three species as a management tool. It is proposed to reduce quotas to sustainable level and ensuring that quotas are realistic and based on accurate population estimates. There is also need to determine the home ranges of the trophy species as they may be utilised in other nearby areas where there is trophy hunting (e.g. the Gokwe CAMPFIRE area). Duration of hunting leases should be reviewed. It is recommended that consideration should be made for the granting of ten years leases, with an option for roll-over for further five to ten years as this encourages long term attitudes to wildlife management and conservation. This will also create the impetus for Safari Operators to make long-term investments such as establishment of anti-poaching units in the trophy hunting industry, thereby contributing to the sustainable utilisation of these species.

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APPENDICES

APPENDIX 1: Data sheet showing years, mean annual trophy size, allocated and utilised quota for buffalo, elephant and lion in SWRA from 2003 to 2013

	buffalo					elephant					lion			
Years	Mean annual trophy size	Allocated	Utilised quota		Years	Mean annual trophy size	Allocated	Utilised quota		Years	Mean annual trophy size	Allocated	Utilised quota	
2003	39.50	20	16		2003	52.44	8	8		2003	25.21	5	5	
2004	38.65	17	17		2004	47.67	6	6		2004	25.19	3	3	
2005	38.06	20	18		2005	55.89	9	9		2005	24.88	2	2	
2006	38.67	20	15		2006	46.67	9	9		2006	No_hunt	2	0	
2007	38.50	20	20		2007	44.75	9	8		2007	24.50	2	1	
2008	38.50	20	16		2008	48.56	9	9		2008	No_hunt	2	0	
2009	35.70	20	20		2009	41.78	9	9		2009	No_hunt	2	0	
2010	36.40	20	20		2010	42.38	9	8		2010	No_hunt	1	0	
2011	37.16	20	19		2011	36.63	9	8		2011	No_hunt	1	0	
2012	36.00	14	14		2012	40.50	7	4		2012	No_hunt	0	0	
2013	35.67	14	12		2013	45.00	6	4		2013	15.00	1	1	

Trophy size measurements were recorded in inches (buffalo and lion) and pounds (elephant) using the Safari Club International (SCI) for (elephant and lion) and the Rowland Ward method for (buffalo).