CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA

Interpretation and implementation of the Convention

Regular and special reports

Appendix-I species subject to export quotas

Leopard

EXPORT QUOTA REVIEW - NAMIBIA

1. Background

During its 17th meetings of the Conference of the Parties (CoP) to the CITES, it was decision was taken that all twelve leopard range states that have an annual export quota established under Resolution Conf. 10.14 (Rev. CoP16) for leopard hunting trophies and skins for personal use, should review their quotas in order to determine whether their quotas are still at levels which are non-detrimental to the survival of the species in the wild.

Leopard (*Panthera pardus*) is listed on Appendix I of CITES. The Namibian Leopard annual export quota for hunting trophies and skins for personal use was set at 100 in 1992 and the annual export quota was reached for the first time in 2003. In 2004, the annual export quota was increased from 100 to 250, and has not been changed since that time.

2. Species biological characteristics

Leopard distribution covers 8,515,935 km² from Sub-Saharan and North Africa to the Middle East and Asia (Stein et al. 2016). However, suitable leopard range has been reduced by >30% worldwide in the last three generations (22.3 years) (Stein et al. 2016). The leopard has the widest distribution of all the cats in Sub-Saharan Africa (Henschel et al. 2005; 2008; Stein et al. 2016). Yet, the estimated regional range loss for leopards is approximately 21% in southern Africa (Stein et al. 2016). Across Southern Africa; Angola, Zambia, Zimbabwe, and Mozambique have declining but

viable leopard populations outside of human dominated areas and Botswana has a continuous leopard population in the North and West (Stein et al. 2016).

Leopard home range sizes and densities of leopard vary with prey availability, habitat and degree of threat ranging from one per 100 km² to over 30 per 100 km² (Henschel et al. 2008). Leopards are almost solitary, female territories are overlapped by larger territories of solitary males (Hayward et al. 2006).

Leopards are long-lived with low reproductive rates (Hunter et al. 2013). Leopards of both sexes reach sexual maturity at 24-28 months though they rarely breed before 3-4 years (Balme et al. 2009). Cubs are born after a gestation period of 90-106 days and litter size at emergence varies from 1-3 cubs (Hunter et al. 2013). Cubs reach independence from 10-18 months, and the interval between successfully raised litters varies from 16-24 months (Balme et al. 2009; Owen et al. 2010). Average mortality of leopard cubs prior to independence varies from 50-90% (Hunter et al. 2013). Even populations fully insulated from human disturbance suffer juvenile mortality as high as 62% (Balme et al. 2013). Mean lifetime reproductive success for female leopards is 4.1 ± 0.8 years (Balme et al. 2013). Survival rates among sub adults (1-3 years old) vary between protected (males – 82%, females – 93%) and unprotected (males - 67%, females – 21%) areas (Swanepoel et al. 2014a). Similarly, survival of adults (>3 years) varies between protected (males – 91%, females – 85%) and unprotected (males – 72%, females – 66%) areas (Swanepoel et al. 2014b). Longevity of wild leopards is poorly known, but females in protected areas have been recorded living to 19 years and males to 14 years (Balme et al. 2013).

3. Ecological adaptability

Leopards have the widest distribution of any felid and are tolerant of a wide range of habitats and climatic conditions, including mountains, bushveld, woodlands, desert and semi-desert, and forests (Hunter et al. 2013). They occur from sea-level to 4600 m above sea-level, in areas receiving <50 mm of rain to areas receiving >1200 mm (Hunter et al. 2013). Leopards are also not particularly water-dependent; in the

Kalahari, leopards have been known to drink only once in ten days (Sunquist and Sunquist 2002).

The leopard has a catholic diet and the broadest diet of all the large predators of 92 prey species, they are non-selective predators but do show preferences in selecting prey (Hayward et al. 2006). Their preferred prey weight is 25 kg or a mean body mass of 23 kg (Hayward et al. 2006). Their wide habitat tolerance is partly due to the breadth of their diet, which also explains their ability to persist close to urban areas (Hayward et al. 2006).

The leopard is highly adaptable and can survive across numerous landscape types as well as not being constrained by boundary fences and therefore freely moves across the landscape (Balme and Hunter, 2004; Balme et al. 2007; Swanepoel et al. 2013). Leopards are one of the few apex predators that occurs both within and outside protected areas and are the least affected by competition from lions and spotted hyenas (Mills and Briggs 1993).

In a Seoraj-Pillai and Pillay (2016) study on global human-wildlife conflict patterns the leopard was the leading carnivore conflict species, as it featured in the greatest number of human–carnivore conflict case studies. This was due to a variety of reasons, first that leopards exhibit an array of biological and behavioural traits that render it a high-impact conflict species (Kissui 2008). It is also a highly adaptable species which occupies the broadest geographic range and is better equipped to utilise human-dominated environments, such as farms, than other large predators (Kissui 2008).

4. **National distribution**

Leopards in Namibia inhabit most of the country except for the highly populated northern region, the arid southeast farmlands and the desert coast (Stein et al. 2011; 2016), (Figure 1 and 2).

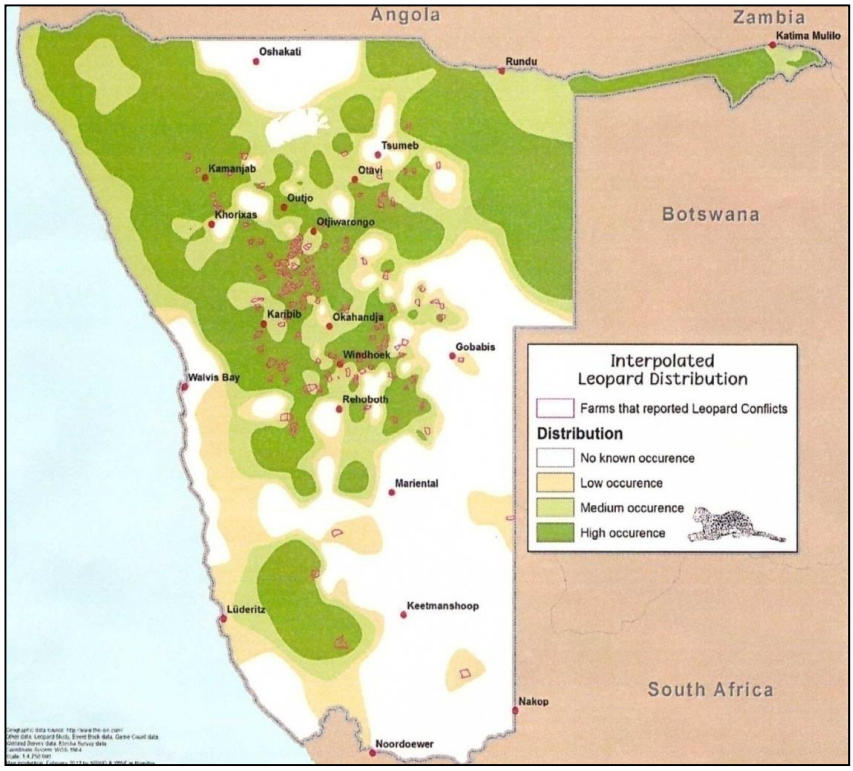

Figure 1. *Distribution and density of leopard in Namibia 2011 (Stein et al. 2011).*

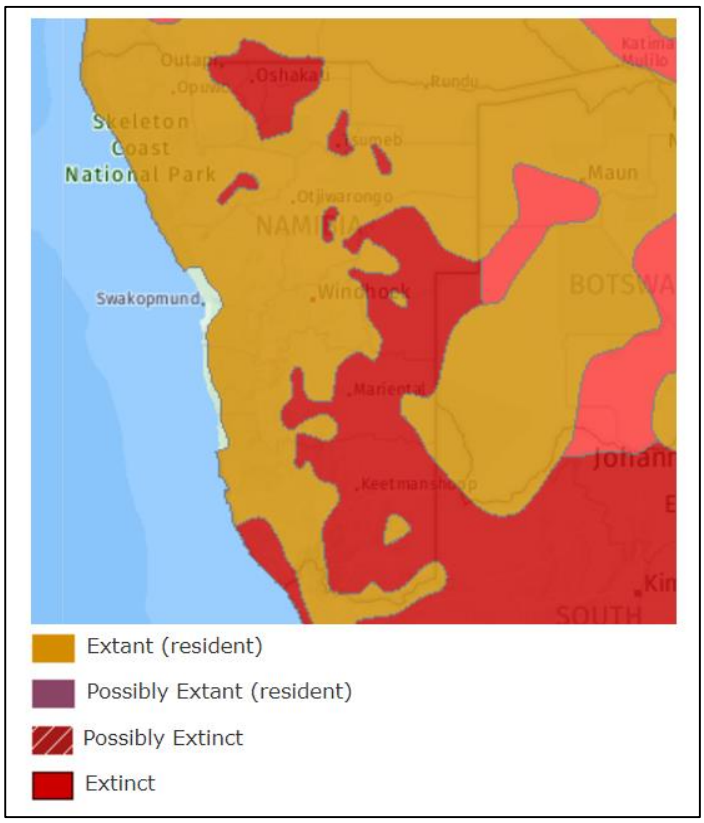

Figure 2. *Distribution of leopard in Namibia 2016 (Stein et al. 2016).*

Approximately 77% of the Namibian land surface is believed to provide suitable habitats for leopard with the highest density of leopard on freehold land, however a significant proportion is still found on communally-farmed state land. Leopard occurs in low numbers in the Kunene and Karas regions and are reported to have disappeared from the north central parts of Namibia (Myers 1996).

Large areas of the country remain as wilderness with much of the historic assemblages of species still present. The area of highest density for leopard falls primarily within the freehold land tenure, but with a significant proportion also in communally-farmed State land. In the area of highest leopard densities, the principal form of land use outside protected areas is livestock (cattle) farming. With Namibia being an arid country, there is a relatively low carrying capacity for livestock, and an increasing trend towards a wildlife-based land-use (CoP13 Doc. 19.1.).

Stein et al. (2011)'s study outlined that the total land area considered to hold high leopard density was 308,586 km^2, or 38% of the country's landmass, primarily located in the mountainous regions of the Khomas Hochland, Mount Etjo and Waterberg regions. The medium density areas, representing 22.5% of Namibia (181,928 km^2), are typically adjacent to the mountainous regions and the ecotones between thickets forest or mountainous areas and the flat, more arid region. The low density areas, covering 9.9% of the country (80,928 km^2), were typically the more arid regions and south-eastern portion of the country. The remaining 29% of the country includes portions of the Skeleton Coast National Park and south-eastern farmlands (238,091 km^2) where leopards are thought to be in low density (Stein et al. 2011).

5. **Population status**

The latest nationwide leopard estimate was provided by Stein et al. (2011) which indicated that the leopard population in Namibia is estimated to be 14 154 (95% CI= 13,356 - 24,706). The population estimate was based on National leopard survey conducted using camera-trapping surveys, questionnaires, spoor tracking technique and evidence of leopard presence provided by multiple stakeholders.

6. National population trend

The Namibian leopard population is healthy and is increasing (Stein et al. 2011). In the mid 1990's, Namibia was thought to maintain a medium-sized leopard population between 1 000 to 10 000 (Nowell and Jackson, 1996). In 2004, the Namibia leopard population was estimated between 5 469 – 10 610 (Stander et al. 2003). Stein et al. (2011)'s study population estimate (Table 1) was 1.5 to 2.8 times higher than the previous estimates presented in 2004. Increase in population estimates is believed to be attributed by the advances in population survey techniques applied and by increases in the leopard population in the country (Stein et al. 2011).

Table 1. *The density estimates for the three study areas with the calculated confidence intervals and extrapolated numbers based on estimated area for each density category (Stein et al. 2011).*

Study	**Density Estimate**	**95 % Confidence Limits**		**Estimated Area**	**Extrapolated**	**95% Confidence Limits**	
Area	**No/100km^2**	**Low**	**High**	**100km2**	**Number**	**Low**	**High**
High	3.1	2.9	4.1	308,091	9,551	8,935	12,632
Medium	2	1.9	4.3	181,928	3,639	3,457	7,823
Low	1.2	1.2	2.8	80,393	965	965	2,251
Absent	0			238,091			
Total				**808,503**	**14,154**	**13,356**	**22,706**

7. Threats

Decline of the global leopard populations by >30% over the last three leopard generations has occurred which is the result of widespread habitat loss (21% in sub-Saharan Africa in 25 years) and prey loss inside African protected areas (Stein et al. 2016). One main factor for the decline in the African population is related to prey declines as leopard population density across Africa tracks the biomass of their principle prey species, medium and large-sized wild herbivores (Marker and Dickman

2005; Hayward et al. 2007). Leopards are also under threat from habitat loss and fragmentation of their range as well as being hunted for the illegal wildlife trade and pest control (Henschel et al. 2008; Stein et al. 2016).

In Namibia Stein et al. (2011) indicated that the key threat to the leopard population was excessive off-takes (illegal) of problem causing leopards as a result of human-wildlife conflict. However, the incidences reported of the leopards killed as problem causing animals has declined over the past eight years (Figure 3). Between 2004 and 2017, 1 458 leopards were reportedly killed as problem causing animals.

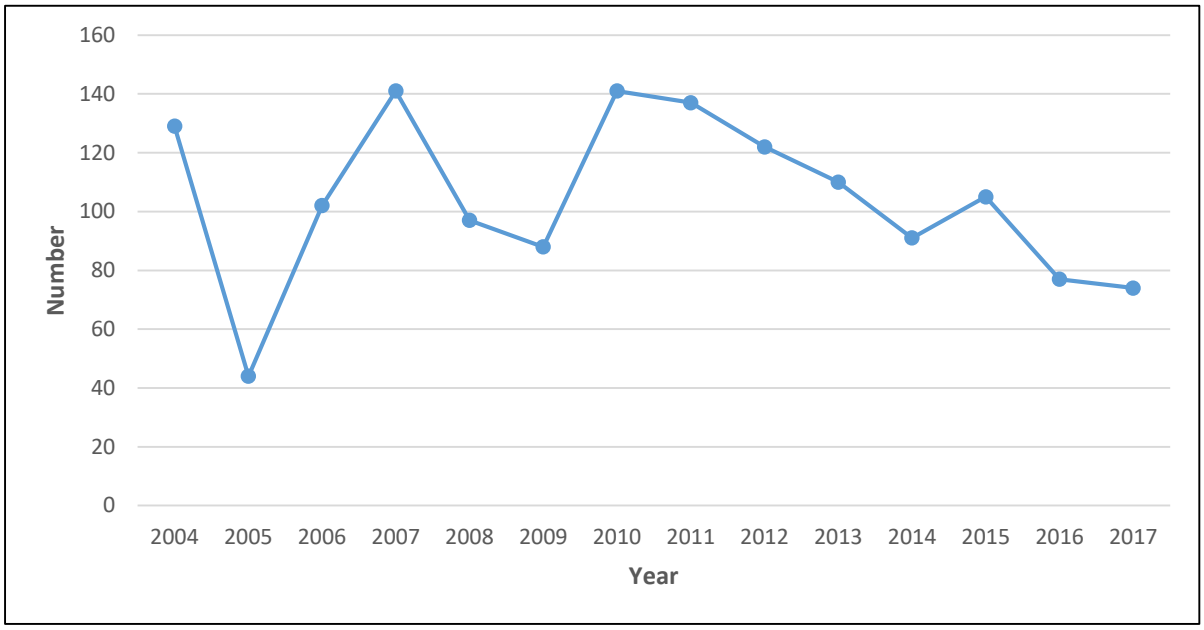

***Figure 3**. Number of leopard killed as problem animals (2004-2017).*

8. Quality of information

Information on leopard population sizes and trends at a national scale is limited. Detailed estimates of abundance are available for only some years Stander et al. 1997, Stander 2000, Stander & Hanssen 2001, Hassen and Stander 2004; Stein et al. 2011. Reliable data on the utilization of the species is available that informs the adaptive management and utilization of the species. Efforts are underway to update the information available on the population status, density and distribution of the leopards through a follow-up leopard survey that is expected to be completed in 2019,

which aims to increase the knowledge base on leopard and better understand the illegal offtake in the form of destruction of problem causing animals that is not declared to the Ministry of Environment and Tourism.

9. Conservation status

Leopard is listed as Protected Game, under the national legislation (Nature Conservation Ordinance4 of 1975, Controlled Wildlife Products and Trade Act, 2008), and as such, no person may hunt a leopard without a permit or kill, possess or trade in leopard products without a permit. Nonetheless, owners or occupiers of land may kill leopards in defence of human life or to protect their livestock. When this happens, it is compulsory to report such killing to the Ministry of Environment and Tourism within 10 days, at which point a permit is allocated possess the skin of such an animal, without the option to sell or export such a skin.

Leopard is also covered under the. The Act provides for stiffer penalties related to illegal possession, poaching, and trade in controlled wildlife products.

10. Utilization and management

Namibia has a well-established and strictly controlled leopard utilization (trophy-hunting) system. Trophy hunting is the main form of leopard utilization in Namibia and is conducted under the strict supervision of registered hunting guides. In addition, only adult male leopards are allowed to be trophy hunted, and their trophies exported in Namibia. Moreover, only free roaming, self-sustaining and adult animals may be hunted as trophies with a minimum skull measurement of 32 cm. A leopard may not be shot within a range of 1km of any other predator kept in any form in Namibia.
As a mechanism of increasing the value of leopard to land users, and to enhance the survival of the species, Namibia encourages trophy hunting as a preferable alternative to simply destroying problem animals as sale and export of specimens from leopards destroyed as a problem causing animal is not allowed.

10.1. ***Leopard Management plan***

Namibia is in a process of developing a leopard management plan using the results from the current national leopard survey expected to be completed in 2019.

10.2. Harvesting quota and monitoring

10.2. 1. Quota allocation

Quota allocation is vital and essential to ensuring the sustainability of any offtake. Leopard hunting is governed, per quota, by the Ministry of Environment and Tourism. Every year, 250 leopard harvesting quota is allocated. Leopard hunting quotas are allocated at a national level, based on the size of the land (2 500ha minimum) and any relevant scientific information available such as estimated population size, hunting success rate, density, habitat and incidences of human-wildlife conflict associated with leopards. In the absence of population estimates, trophy quality and trend assessment are used as a guide to determine population status of the species in the area. In populations where high quality trophies are consistently being harvested, the population is assumed to be good since only a healthy population could consistently produce prime, healthy males (Begg and Begg 2009). Where hunters are harvesting sub adult males or females, the population health is assumed to be poor (Begg and Begg 2009).

10.2.2. Hunting monitoring

Leopard off-take is well monitored in Namibia. A leopard hunting permit must be obtained before the leopard hunt commences and a copy of the permit must be in the physical possession of the hunting guide while the leopard is being hunted. The hunting operator concerned must also give notice of the leopard hunt to the regional office of the Ministry of Environment and Tourism seven days before the hunt commences. The hunting permit is issued to a hunter and it is valid only for a specific time and, valid only within the hunting area as specified on the permit. In addition, a telephonic report must be given to the staff member responsible for the predator hunting permit register within 72 hours of the hunt regardless of the success of the

hunt. The hunting guide is further required to submit the prescribed leopard hunting record sheet to the Ministry of Environment and Tourism for all leopard hunts, whether successful or unsuccessful. The record sheet provides information required for the adaptive management of leopard utilization such as; the details of the hunting guide and the hunter, duration of the hunt, hunting success, hunting method, information relating to bait sites, records of species visiting the bait site, number and type of predators seen more than 1 km away from the bait, and body measurements and photographs of the hunted animal (see attached record sheets, Annexure 1).

10.2.3. Genetic

Genetic is information is not yet being used to inform the management and utilization of leopard in Namibia. However, an initiative was started in 2018 to collect genetic materials from all hunted animals including the leopard for use in managing informed decisions on conservation of the species.

10.2.4. Inspection of leopard trophies

The control of the harvested leopard trophies is conducted during tagging sessions whereby skins and skulls of the hunted leopard are brought to the Ministry of Environment and Tourism for inspection and tagging. This step is compulsory for the issuance of a CITES export permit.

Upon reception, each skull is identified by photographs. In accordance with Regulations Relating to Nature Conservation Ordinance 1975 (Ordinance 4 of 1975) as amended, skull of the hunted leopard must be brought to the Ministry of Environment and Tourism for measurements before the export permit is issued. At least a minimum set of four (4) pictures of the skull are taken from various angles to show the cusps of molars and premolars as well as broken teeth and teeth colorations.

The measurement of quantitative parameters describing the skull are taken. A set of four measurements are taken for describing the skull (e.g. total length, biorbital breadth, canine lengths). Some of the parameters measured have been shown to predict the leopard's age under three years of age only (e.g. skull total length (Stander

1997; Balme et. al 2010; Balme et. al, 2012; Gonzale et al. 2017). Additional measurements such as sagittal crest and interferential structures are also taken in account to test whether they can predict the age of trophies.

Furthermore, detailed qualitative inspection of the skull is also performed whereby each tooth is carefully inspected in regards to its integrity and erosion; additively the integrity and sharpness of the enamel ridges of the canines are assessed, as well as groves on the lower canines. The diagnosis of age is based on published chronologies of tooth eruption and wear in relation to the age of leopard (e.g. Gonzale et al. (2017). The closure and obliteration of cranial sutures are also assessed (Smuts et al. 1978).

11. Leopard utilisation 2004 - 2017

The number of leopards hunted in Namibia between 2004 and 2017 is outlined in Figure 4. On average, 142 leopards were hunted in Namibia between 2004 and 2017, representing 56% annual quota uptake. Prior to 2008, there was a strong increase in number of leopard hunts, with the optimum of the allocated quota of 250 reached in 2008. The high level of success of in leopard hunt was because there was no limit on the number of leopards to be hunted per outfitter, both male and female leopards allowed to be hunted, and stalking, and hunting with dogs was allowed. . This prompted the Namibian government to impose leopard trophy hunting moratorium in 2009, in order to review the national leopard population and hunting management strategies. Leopard hunting regulations were reviewed and new hunting management strategies were incorporated to the regulations. Hunting of female leopards and hunting with dogs was outlawed while limits were set on the number of leopards an outfitter may hunt. Conversely, after 2010, the number of leopards hunted remained low, but steadily continues to increase towards 2017 (Figure 4).

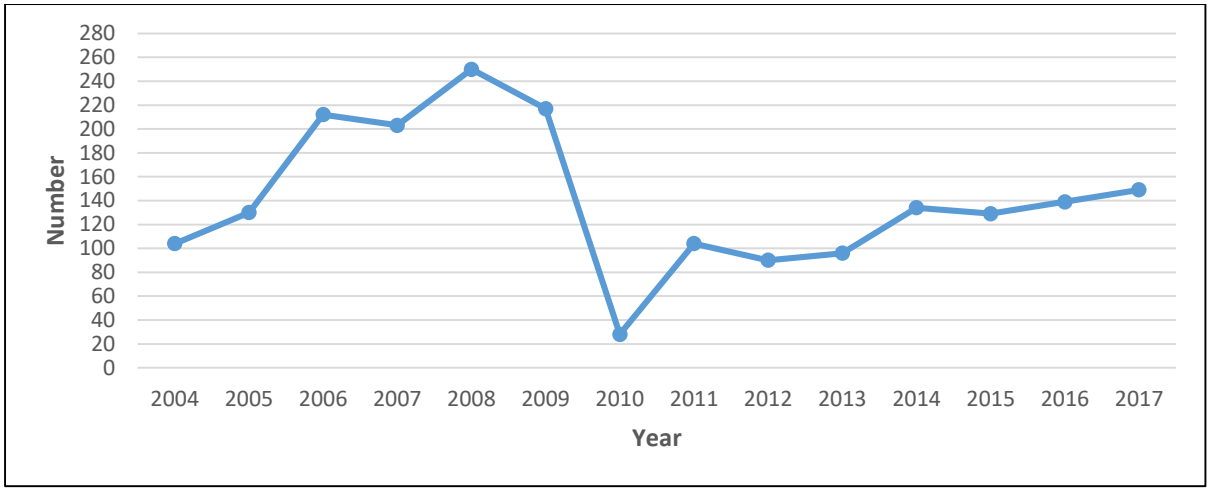

Figure 4. *Number of leopard trophy hunted (2004 – 2017*).

12. Trophy quality assessment

Leopard trophy measurements (length +skull) were analysed to determine the trophy quality of leopards hunted in Namibia between 2004 and 2017. The skull size trend analyses shows a constant pattern since the harvesting quota was increased in 2004. This pattern indicates a stable trophy quality for leopards hunted over the past thirteen years (Figure 5). The analysis demonstrates that all leopard skulls analysed between 2004 and 2017 were greater than 32cm (the cut-off limit). About 69% of the leopard skulls assessed measurements ranged between 32cm to 40cm, while 30% of the skulls ranged between 41cm to 50cm (Figure 6).The highest annual mean skull size was recorded in 2015 (μ = 40) while the least mean annual trophy size was (μ = 32), recorded in 2009.

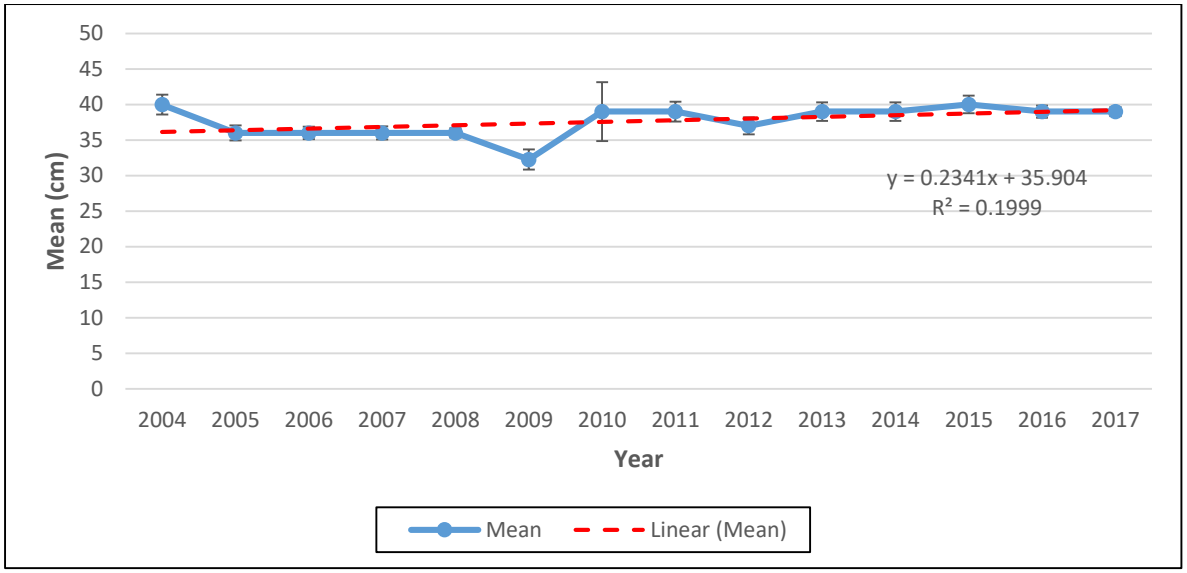

Figure 5. *Mean annual skull size trend of leopard hunted (2004 – 2017).*

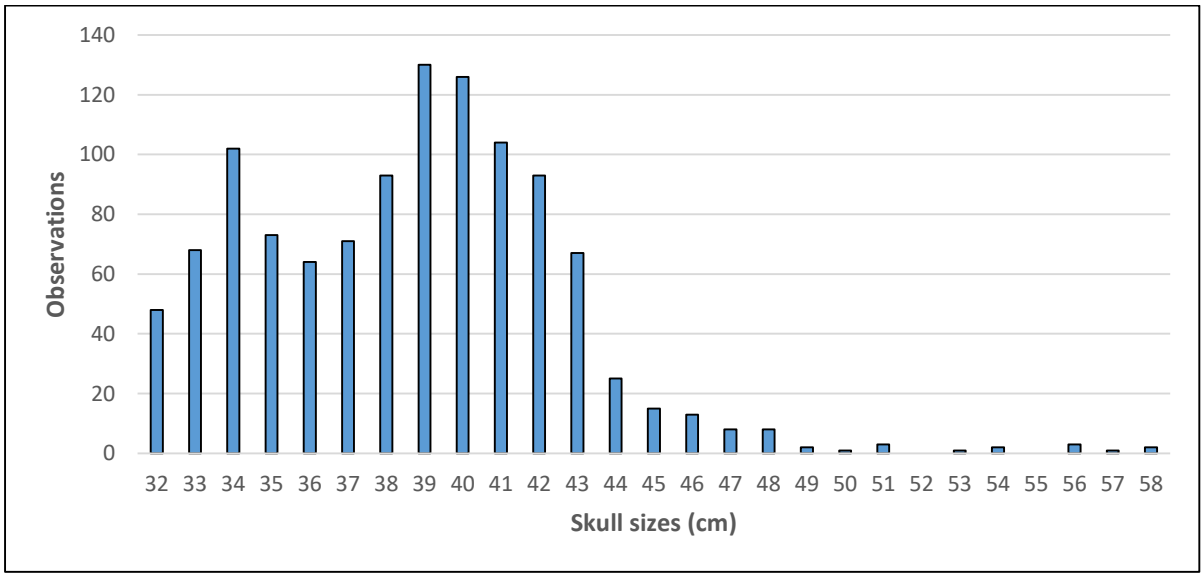

Figure 6. *Frequency distribution of leopard skull sizes (2004 - 2017).*

13. Economic benefits and incentive for species conservation

Leopard hunting is one of the mainstay of safari hunting in Namibia; attracts tourists and hunters which in turn brings income to the landholders on both freehold and conservancies. Communal conservancies have been established throughout the country and they are currently fully managed by the local communities. Twenty percent of the leopard hunting quotas in Namibia annually are allocated to the conservancies.

Revenue generated from trophy hunting within the conservancies is directly used by the local communities for their own benefit. Moreover, many disadvantaged local communities in Namibia have benefited from trophy hunting because some trophy-hunting operators have built schools, clinics, tourism facilities, and erected communal structures such as community halls (NACSO, 2013). Moreover, hunting Safari Operators also creates employment, financial support to anti-poaching, provision of meat to locally disadvantaged communities.

Eighty percent of the leopard hunting quota is allocated to the freehold landowner in Namibia. Revenue generated from leopard trophy hunting is used to offset the cost of livestock and game loss as well as for different farming activities such as; the maintenance of farm equipment, anti-poaching and payment of farm workers' salaries and other farming activities. By offsetting the costs of income lost the landowner is more likely to have to higher tolerance to leopard remaining and thriving on their farm.

Furthermore, because of the associated financial and economic benefits, trophy hunting of the leopards has the potential to increase tolerance towards leopards. Human–leopard conflict occurs across the leopard's range in Namibia. Often, this results in "problem animals" being removed through lethal means.
Leopards are reported to be responsible for most killing of livestock, mainly cattle in Namibia. The mean number of cattle reportedly killed by leopard annually was 726, ranging from 805 in 2008 to 646 in 2010. In addition, leopards were reported to have killed annually on average 1,926 head of game increasing the reported number from 1,795 in 2008 to 2,043 in 2010 (Stein et al. 2011). However, landowners in Namibia has shown to have tolerance toward leopards than other carnivore species because of the revenue generated from leopard trophy hunting. Revenue generated from leopard trophy hunting is used as an incentive to offset the loss caused by them and other carnivores (Primack 2006). In addition, leopard trophy hunting can also be used as a mechanism to reduce illegal hunting of the species. Trophy operators together with community members usually conduct anti-poaching patrols on a daily basis in order to protect the wildlife they depend on (Primack 2006).

14. Discussion

The leopard population in Namibia is currently stable and increasing, and widely distributed throughout the country, particularly in the central and northern parts of Namibia. This is supported by the recent National leopard survey which estimated the Namibian leopard population to be 14 154 (95% CI= 13,356 - 24,706) (Stein et al. 2011). As it stated in section 6, this estimate is thought to be 1.5 to 2.8 times higher than the previous estimates presented in 2003. Moreover, trophy quality analysis indicates a positive increase in the annual mean skull size over the fourteen years (figure 3). In addition, leopard harvesting quota was set at 2.4% of the total population estimated (Stein et al. 2012). Namibia has also adopted good management harvest practices, and a strictly controlled trophy hunting practise in the country. Therefore, current Namibian annual export quota of 250 trophies is sustainable, and it does not pose any risk of extinction of leopards throughout country. Furthermore, the current international trade in hunting trophies does not pose any risk to the survival of this species in Namibia.

Currently, there is a national leopard census project underway. The project takes a multi-disciplinary approach, inside and outside national parks, by combining ecological methodologies and social science to understand the pressures on, and status of, the leopard population across Namibia. The project has three key objectives;

- To assess the impact of problem animals and rate of removal,
- To update leopard density and distribution across Namibia and
- To review of the yearly trophy hunting permits.

To achieve these objectives the project will collaborate with multiple stakeholders to ensure that all relevant leopard data in Namibia is utilised. The information obtained from this study will feed into the Ministry of Environment and Tourism's national management strategy plan for leopard. In addition, leopard harvest quota may be reviewed once this new information becomes available.

Conclusion

The leopard population in Namibia is widely distributed throughout Namibia and has recorded upward trends. The trophy size of the hunted animals have remained stable over the years and more of the observations has been above the set norm of 32 cm. Off-take of the leopards has indicated increasing trends since 2010 when new utilization management practices were adopted. All of these indicates a healthy population of leopard in Namibia that is able to sustain the current levels of off-take.

Based on the above-mentioned observation, the off-take of the Namibian leopard as approved by the CITES is sustainable, and is non-detrimental to the population. It is therefore recommended that the current approved annual export quota of 250 leopard hunting trophies and skins for personal use is maintained.

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