The Director - General Department of
Environmental Affairs
Attention: Ms Makganthe Maleka
Private Bag X447
PRETORIA
0001
South Africa

21 February 2017

Dear Ms Makganthe Maleka,

Draft norms and standards for the management and monitoring of the hunting of leopard in South Africa for trophy hunting purposes

Please find below "*written representations or objections*" to the proposed "*Draft norms and standards for the management and monitoring of the hunting of leopard in South Africa for trophy hunting purposes*" - (the "*draft norms and standards*"), as notified in Government Gazette, Vol. 620, No. 40601, Notice 75, Department of Environmental Affairs (DEA), dated 8 February 2017.

Due to the lack of fully published data within Notice 75 draft norms and standards, it is impossible for anyone to independently assess the SANBI's proposed leopard hunting quota, because the basis for estimated leopard densities and populations in potentially outdated, with no publicly available data that gives confidence that a SANBI leopard population estimate (not published) is valid.

Concerns were raised in 2009 over the sustainability of leopard trophy hunting in South Africa by Balme et al (2009) [1], what has improved since? What evidence is there that leopard populations today within South Africa are able to sustain the hunting quotas proposed in Notice 75 draft norms and standards?:

- The IUCN Red List (*Pathera pardus – "Vulnerable"*) considers the leopard population within "*South Africa appear to be decreasing from previous estimates with Leopards disappearing from areas with increased human development and areas of intensive conflict with humans.*" Furthermore, - Swanepeol et al (2014) [2] stated that "*we found an unequivocal risk of population decline in South Africa as a whole as well as for several provinces.*" How does the trophy hunting of leopards help offset that acknowledged decline in the leopard

population within South Africa and where is the independent scientific evidence to prove it?

- The financial contribution of leopard trophy hunting (and trophy hunting in general) is minimal to South Africa's GDP, so why take the risk? Again and again, trophy hunting has been proven as a broken theory (alluded to within Swanepeol et al (2014) [2]; Leopard (Panthera Pardus) Case Study (2008) [3] and Balme et al (2009) [1]) unable to deliver the promised regulatory conformity and any notion of sustainability, or any overwhelming positive contribution to the species' conservation.

- In January 2016 [4] the DEA set a zero leopard hunting quota across all provinces. The DEA accepted the negative non-detrimental finding (meaning it found it detrimental) to hunt leopards from 2016. The DEA's directive/statement concluded that "*the number of leopards in the country is unknown and, for this reason, the sustainability of hunting cannot be accurately assessed*" [5]

  o The directive, issued by the DEA appeared as a "*negative non-detrimental finding,*" ie as leopard specialist Guy Balme of Panthera explained at the time "*that this means hunting is likely to have a detrimental effect.*" [5]

  o Guy Balme also reportedly said at the time in 2016 "*We just don't know how leopards are faring in South Africa. They're secretive, mainly nocturnal, solitary and range over huge areas. Counting them requires intensive research using expensive technology such as camera traps, which can only be deployed over small areas, far smaller than the areas in which hunting quotas are determined.*" [6]

- What does the SANBI/DEA think the 2017 leopard population is within South Africa that can be quantitatively applied to any hunting quota, when in 2016 leading experts stated that leopard populations with South Africa were unknown and virtually unknowable?

- Where are the SANBI's estimates for male leopards ≥ 7 years old in any given province with a proposed hunting quota? Where is the confidence that the hunting quotas proposed within the Notice 75 norms and standards (also given at Figure 4 – Appendix 1) are sustainable and not likely to be detrimental to the species' survival?

- Why is there no published data for the "*province-wide camera-trapping efforts* - (SANBI unpub. Data) that is supposed to support the SANBI's knowledge and understanding of South Africa's leopard population?

If a leopard hunting quota is issued based upon weak and passive penalties as proposed at (7) of the Notice 75 draft norms and standards, then wrong-doing will most likely go unpunished.

Leopards face many threats (persecution as cited by Leopard (Panthera Pardus) Case Study (2008) [3]), none of these threats are considered or offset by the contents of the Notice 75 draft norms and standards.

In the absence of credible data to work from (the SANBI has not been explicit in the quantitative leopard population estimates is has used to derive the proposed hunting quotas), the concept of the cautionary principle is required, always erring on the pessimistic scenario, rather than a best case scenario, or 'hope' to try to justify a desire to perpetuate a delusion "*there must be plenty of leopards left to kill.*"

How do any of the deficiencies in Notice 75 draft norms and standards, or hunting's minimal positive contributions, offset the proposed trophy hunting of baited leopards and the export of trophies that are likely to be "*detrimental to the survival of the species?*"

All of these points are expanded upon in the attached Appendix 1.

Yours sincerely,

Stephen Alan Wiggins   Chris Mercer

Founder of International Wildlife Bond (IWB)   Campaign Against Canned Hunting (CACH)

Appendix 1 – "written representations or objections" to the proposed "Draft norms and standards"

1 Penalty for Wrong-doing

At 4.(2) of the draft norms and standards, the penalty for non-compliance (for a given hunt not "*harvesting*" a male leopard (*Panthera pardus*) ≥ 7 years old) is the passive threat that the "*issuing authority*" at some point in the future (next hunting season) "***may***" not allocate a leopard hunt quota for the affected Leopard Hunting Zone (LHZ).

How likely is it that the "*issuing authority*" has the motivation to impose any such threatened penalty for a single offence, or repeated offences? What happens if there are repeated offences within a given LHZ, will the threat of perhaps the affected LHZ being removed from next season's hunting allocation still be delayed and consideration "***may***" be given just before next season's commencement?

The risk is, that there will be no immediate potential for re-percussions for singular, or repeated wrong-doing (intentional, or otherwise) within a given hunting season with regard to the affected LHZ's having a hunting quota removed at some point, potentially a point far off in the future.

The deterrent for wrong-doing as currently written at 4.(2) appears passive and weak, so the "***may***" should be removed and the withdrawal of an affected LHZ's hunting quota instilled with immediate effect upon any instance of wrong-doing.

At (7) of the draft norms and standards, again there is a weak and passive disincentive for wrong-doing (intentional, or otherwise) for a given hunt not "*harvesting*" a male leopard ≥ to 7 years old (i.a.w. 4.(1)). There only exists a subjective, passive threat of repercussions for the "*hunting of a leopard…….in a manner that could contribute to a disruption in the stability of the population, it could result in the following disincentives…..*"

How will the impact of that "*disruption*" be scientifically assessed by the "*issuing authority*" and how likely is it that the "*issuing authority*" has the motivation to impose any such threatened penalty if offered alternative incentives not to?:

(a) the hunter being punished; and/or

(b) meaningful restrictions on the hunting outfitter; and/or

(c) meaningful restrictions on the professional hunter; and/or

(d) trophy export permit withdrawn; and/or

> Note: The passive "*could result*" at norms and standards (7)(d) is contradicted at Appendix 1, where a definitive *"No export permits will be awarded for unsuitable trophies (i.e. female leopards or males <7 years old). The hunting permit will also be withheld from the affected LHZ for at least one year to allow the leopard population time to recover."* So is non-compliance a definitive "*no export permit*" and the "*hunting permit*" withheld for one year*,* or a "*could result*" in the trophy export permit being withdrawn and "c*ould result*" in "*the hunting permit"* being withheld *"from the affected LHZ?"*

(e) seizure of the hunting trophy; and/or

(f) criminal charges being pursued.

The obvious concern is that without mandated repercussion at (7) of the Notice 75 draft norms and standards, there will be only limited incentive for adherence to 4(1)'s "*only an adult male leopard that is seven years or older may be hunted*" restriction and any wrong-doing either covered-up, or any repercussions waived.

1.1 Monitoring of Leopards

At 5.(2)(a) and (b) of the Notice 75 draft norms and standards it is proposed that photographs will be taken as some sort of verification via a "*hunting report*" of each leopard kill "*harvested.*" What systems will be in place to stop the fraudulent reuse of photographs from other kills to cover-up wrong doing? For example, previously taken male leopard kill pictures reused to cover-up the killing of a sub-adult male, or female?

1.2   Management of Leopard Hunts

The Notice 75 draft norms and standards states "*Packer et al. (2009) showed that harvesting male leopards ≥ 7 years old had little impact on population persistence.*" However, within the same reference, Packer et al. (2009) [7] it also stated how sensitive leopard sustainability is to the male age harvested for a trophy:

> *"Sport hunting is an inherently risky strategy for controlling predators as carnivore populations are difficult to monitor and some species show a propensity for infanticide that is exacerbated by removing adult males……..Leopards (Panthera pardus) may be more sensitive to sport hunting than solitary lions (with a safe minimum age of 6–7 yrs of age)"*
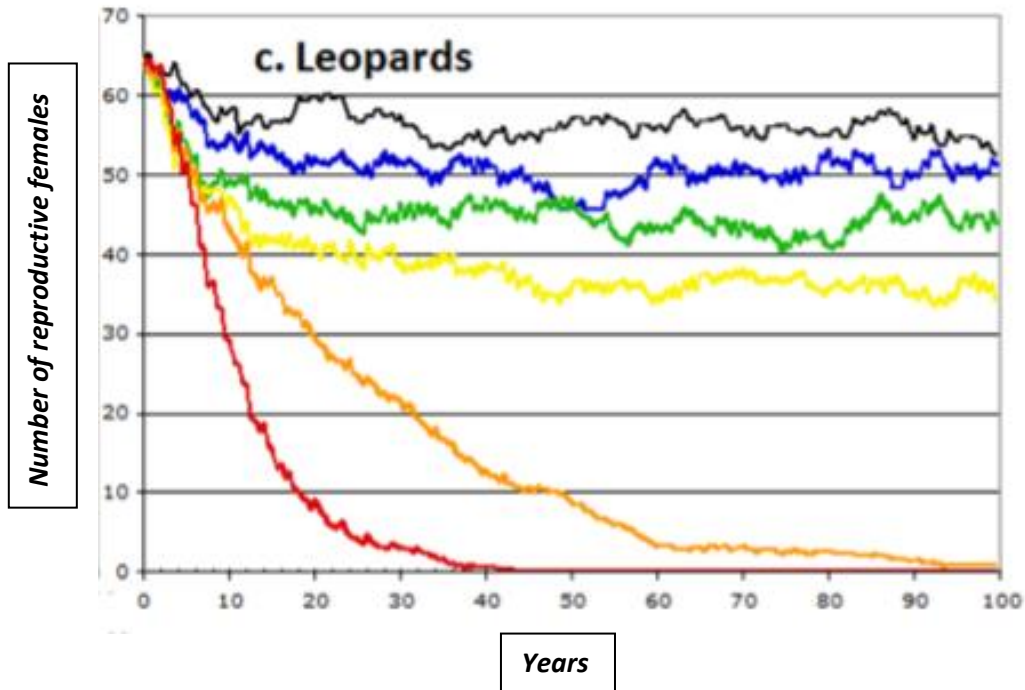
So, the penalties and incentive for any leopard harvesting that does not ensure by all means available adherence to harvesting male leopards ≥ 7 years old could have devastating impacts if/when younger leopards are taken either through wilful deceit, or perhaps genuine mistakes.

Figure 1 – "*Average number of adult females in population simulations where all eligible males are removed during a 6-mo hunting season each year for 100 yrs. Colors indicate outcomes for different age minima for trophy males; each line indicates average from 20 runs. C. Population changes for leopards based on long-term data from Phinda Private Game Reserve and other sources***" - Packer et al. (2009)** [7]

With regard to the accuracy of ageing a male leopard via a given leopard's dewlap size (Balme et al. (2012)) [8] states:

> "….excessive trophy hunting can artificially elevate male turnover and increase infanticide, potentially to unsustainable levels. Simulation models show that the likelihood of safe harvests can be improved by restricting offtakes to males old enough to have reared their first cohort of offspring to independence; in the case of African leopards, males were ≥7 years old."

Balme et al. (2012) [8] states a high confidence level for "*discerning males ≥7 years old were high (83–100%)*" by dewlap assessment – so not the "*90-100%*" quoted within Notice 75 draft norms and standards.

In addition Balme et al. (2012) [8] stated that the study results implied "*the aging ability of hunters could theoretically improve with appropriate training.*" So, the improvement of hunters' ability to accurately age leopards remains an unproven "*theory*" when applied in the field and the application for successful (essential for conservation) leopard hunting…….concluding "*implementation would require major reform within the regulatory framework and the hunting industry*" also stipulating that the age limitation proposed "*would require strict enforcement by government authorities to be effective.*"

In this respect, the Notice 75 draft norms and standards proposes that "*Hunting outfitters will also be required to complete of an online leopard trophy selection examination to be able to apply for a leopard hunt*" via a website "*Under Construction*" – www.saleopardhtunign.com/exam-options

How will this examination be administered to ensure it is not subject to fraud to obtain results favourable to the hunting fraternity, for example:

- One person taking the on-line "*trophy selection examination*" on behalf of another to falsely create the appearance of compliance?

- How will the website's contents be adapted per exam to ensure set questions and answers are not widely distributed leading to fraudulent examination success?

- Who will administrate the examinations to ensure independence and fraud detection?

2 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) Regulation

The African leopard (*Panthera pardus*) is CITES Appendix I listed, but hunting is currently permitted within CITES 'approved' hunting quotas, with South Africa's proposed quota yet to be approved.

The 'abundance' (or lack thereof) of leopards is virtually unknowable - the leopard is highly elusive and it would take vast resources to count every one in existence - but still hunting quotas exist. So, any reference to leopard population numbers is based on modelled estimates - any proposal to base hunting quotas on leopard species numbers is scientifically subject to risk/confidence levels that the source data cannot always reliably substantiate.

3 Proposed SANBI Leopard Hunting Quota and Leopard Population Source Data

The overall proposed (SANBI) annual leopard hunting quota of 88 male leopards ≥ 7 years old and the claimed "*maximum sustainable harvest rate of 3.6%*" of male leopards is duly noted (draft norms and standards, Appendix 1, "*Key principles informing the leopard hunting norms and standards,*" Table 1, "*Proposed annual leopard hunting quota for each province. Figures in parentheses indicate quotas for provinces which have traditionally not permitted trophy hunting of leopards*").

It is understood that the SANBI has established proposed leopard hunting quotas per province (given at Figure 4 below) as detailed in the methodology at Notice 75 draft norms and standards, Appendix 1, "*Key principles informing the leopard hunting norms and standards.*"

The basis for the methodology employed by the SANBI is referenced as:

- "*population density according to Swanepeol et al (2014)*" [2]*;*

  - *Population density based upon assessing factors such as range overlap, prey density, camera trapping data, home range analysis, GPS collar tracking, sign survey data*

- "*province-wide camera-trapping efforts*" (SANBI unpub. Data) - as per *"Method 2, leopard density was estimated by applying mark recapture frame work to camera trapping data presumably?" Swanepeol et al (2014), Appendix 2"* [2]

This raises a number of fundamental questions on how any current, applicable estimated leopard population sizes have been derived:

- How can any credibility be given to "*efforts*" for "*province-wide camera trapping*" (an essential tool in leopard population estimate methodology) if verification of any published data is denied for public/independent scientific scrutiny?:

  - The SANBI's mission is "*To champion the exploration, conservation, sustainable use, appreciation and enjoyment of South Africa's exceptionally rich biodiversity for all people.*"

  - How can the aim of "*sustainable use*" or claims of "*maximum sustainable harvest rate*" of leopards be publically scrutinised if the base data used in any proposed leopard hunting quota in not fully published and shared for public, or independent scientific scrutiny?

- The SANBI's base estimated leopard populations sizes have been derived from Swanepeol et al (2014), Appendix 2 "*Leopard densities (no./km^2) in each provincial biome that was used to estimate leopard population size in South Africa*" [2] – Given at Figure 2 below:

  - However, the estimated population size (Figure 2 below) is based upon an estimated leopard density using various methods dated from 1972 – 2010. The 'source' is given (where published) as between 1984 – 2011;

APPENDIX 2. Leopard densities (no./100 km²) in each provincial biome that was used to estimate leopard population size in South Africa.

Study no.	Province	Biome/bioregion	Study site	Density	Method	Year	Source
1	Mpumalanga	Lowveld	Southern Kruger National Park	15.63	1[a]	1972	Bailey (2005)
2	Mpumalanga	Lowveld	Central Kruger National Park	15.4	1	1972	Bailey (2005)
3	Mpumalanga	Lowveld	Central Kruger National Park	4.25	1	1972	Bailey (2005)
4	Mpumalanga	Lowveld	Southern Kruger National Park	3.01	1	1972	Bailey (2005)
5	Limpopo (Botswana)	Lowveld	Tuli Game Reserve	8	2[b]	2005–2006	Steyn (2008)
6	Limpopo	Lowveld	Northern Kruger National Park	6.33	1	1972	Bailey (2005)
7	Limpopo	Bushveld	Soutpansberg	19.97	2	2008	Chase-Grey (2011)
8	Limpopo	Bushveld	Welgevonden Game Reserve	4.33	2	2008–2010	L. H Swanepoel, unpubl.
9	Limpopo	Bushveld	Waterberg Biosphere farms	3.18	2	2009	L. H Swanepoel, unpubl.
10	Limpopo	Bushveld	Lapalala Wilderness	3.05	2	2008–2010	L. H Swanepoel, unpubl.
11	KwaZulu-Natal	Lowveld	Mkuze National Park	11.11	2	2005	Balme et al. (2010)
12	KwaZulu-Natal	Lowveld	Phinda Private Game Reserve	7.51	2	2005	Balme et al. (2010)
13	KwaZulu-Natal	Lowveld	Zululand Rhino Reserve	4.2	2	2006	Chapman & Balme (2010)
14	KwaZulu-Natal	Lowveld	Game farm area in KZN-Natal	2.49	2	2005	Balme et al. (2010)
15	North West	Bushveld	Madikwe Nature Reserve	3.86	3[c]	2003	H.L.P. Kelly, unpubl.
16	North West	Bushveld	Pilansberg Nature Reserve	3.45	4[d]	2007	Hayward et al. (2007)
17	Western Cape	Fynbos	Cederberg Mountains	2.3	5[e]	2004–2007	Martins (2010)
18	Western Cape	Fynbos	Cederberg Mountains	1.8	5	2004–2007	Martins (2010)
19	Western Cape	Fynbos	Cederberg Mountains	0.8	3	1985	Norton & Lawson (1985)
20	Western Cape	Karoo	Cederberg Mountains	0.9	5	2004–2007	Martins (2010)
21	Western Cape	Karoo	Cederberg Mountains	0.25	5	2004–2007	Martins (2010)
22	Eastern Cape	Fynbos	Baviaanskloof	1.3	5	2007	McManus (2009)
23	Eastern Cape	Fynbos	Baviaanskloof	0.3	5	2007	McManus (2009)
24	Eastern Cape	Lowveld	Baviaanskloof	1.3	5	2007	McManus (2009)
25	Eastern Cape	Lowveld	Baviaanskloof	0.3	5	2007	McManus (2009)
26	Northern Cape	Kalahari	Kgalagadi National park	0.62	5	1984	Bothma & Le Riche (1984)
27	Northern Cape	Karoo	Orange River Basin	0.35	6[f]	1988	C. Stuart & T. Stuart, unpubl.

[a]Method 1; leopard density was estimated by using home range overlap and prey density.
[b]Method 2, leopard density was estimated by applying mark recapture frame work to camera trapping data.
[c]Method 3, leopard density was estimated by using home range analysis and overlap.
[d]Method 4, leopard density was estimated by making predictions on prey density and prey preferences.
[e]Method 5, leopard density was estimated with GPS collar home range data.
[f]Method 6, leopard density was estimated by using sign survey data.
Additional references for Appendixes 1 and 2

BOTHMA, J.D.P. & LE RICHE, E.A.N. 1984. Aspects of the ecology and the behaviour of the leopard Panthera pardus in the Kalahari Desert. Koedoe 27: 259–279.
CHAPMAN, S. & BALME, G. 2010. An estimate of leopard population density in a private reserve in KwaZulu-Natal, South Africa, using camera-traps and capture–recapture models. S. Afr. J. Wildl. Res. 40: 114–120.
HAYWARD, M.W., O'BRIEN, J. & KERLEY, G.I.H. 2007. Carrying capacity of large African predators: Predictions and tests. Biol. Conserv. 139: 219–229.
MARTINS, Q.E. 2010. The ecology of the leopard Panthera pardus in the Cederberg Mountains. PhD. thesis University of Bristol, Bristol, U.K.
McMANUS, S.J. 2009. Spatial ecology and activity patterns of leopards (Panthera pardus) in the Baviaanskloof and Greater Addo Elephant National Park (GAENP), Eastern Cape Province, South Africa. M.Sc. thesis, Rhodes University, Grahamstown, South Africa.
OWEN, C. 2006. Reproductive biology and population ecology of leopards (Panthera pardus) on Karongwe. M.Sc. thesis, University of KwaZulu-Natal, Durban, South Africa.
STANDER, P.E., HADEN, P.J., KAQECE & GHAU 1997. The ecology of asociality in Namibian leopards. J. Zool. 242: 343–364.
STEYN, V.P. 2008. The social-spatial organization of leopards (Panthera pardus) in the northern Tuli Game Reserve. M.Sc. thesis, Tshwane University of Technology, Pretoria, South Africa.

Figure 2 - from Swanepeol et al (2014) [2]**, Appendix 2 "*Leopard densities (no./km²) in each provincial biome that was used to estimate leopard population size in South Africa*"**

Which begs the question, if the Swanepeol et al (2014) [2] estimated leopard densities are outdated (for example, Mpumalanga (Kruger National Park), 1972, employing "*Method 1: leopard density was estimated by using home range overlap and prey density*") and there is no publically available "*province-wide camera trapping*" data to say how, or indeed if any efforts has been made to update data, for densities and estimates. What credibility can there be that the SANBI, or DEA has any real idea of current 2017 leopard populations?

The 2005 source given for the Mpumalanga (Kruger National Park) leopard density used by the Swanepeol et al (2014) [2] (given Figure 2) is Bailey, T.N. (2005) [9], "*The African leopard: ecology*

and behaviour of a solitary felid." However, at Table 5.3, page 86; Bailey, T.N. (2005) [9], the observed data used for modelling is again taken from 1973 – 1975 – given at Figure 3 below:

TABLE 5.3 *Estimate of Leopard Populations*

| Area | Year | Adults | | Subadults and Older Cubs | | Total |
		Marked	Unmarked	Marked	Unmarked	
Sabie River study area	1973	2	3	2	2	9
	1974	3	2	4	1	10
	1975	4	0	4	0	8
Nwaswitshaka River study area	1973	1	8	1	2	12
	1974	7	2	3	0	12
	1975	8	1	2	0	11
South side of Sabie River, west of Skukuza	1973	1	3	1	?	5+
	1974	0	3	1	?	4+
	1975	0	3	0	?	3+
South side of Sabie River, east of Skukuza	1973	0	4	?	?	4+
	1974	2	2	?	?	4+
	1975	?	?	?	?	3+
North side of Sand River	1973	1	?	?	?	2+
	1974	1	1	?	?	2+
	1975	1	1	?	?	2+

Figure 3 – from Bailey, T.N. (2005) [9], page 86,"*The African leopard: ecology and behaviour of a solitary felid - Table 5.3"*

So, it would appear that the SANBI is using estimate leopard population densities to extrapolate leopard populations estimates via Swanepeol et al (2014) [2] that in some cases, the observed base data used from Bailey, T.N. (2005) is over 42 years old (Mpumalanga (Kruger National Park)), itself based on a method using "*home range overlap and prey density*." Surely, the "*prey density"* has changed over the past 42 years?

Or perhaps the source data has been overlaid by Swanepoel et al. (2013) [10] ("*Extent and fragmentation of suitable leopard habitat in South Africa*") and/or by "*province-wide camera-trapping efforts*" (SANBI "*unpub. Data*")?

However, the plausibility of using such old 1972 data as valid in a 2017 leopard population assessment seems dubious, regardless of the use in 2014 by Swanepeol et al (2014) [2] (and Swanepoel et al. (2013) [10] referencing Bailey, T.N. (2005)).

The SANBI is funded by the DEA, So where is the independent, 2017 scientific verification that is not under the direct control of the DEA?:

> "*SANBI is a public entity under the Department of Environmental Affairs (DEA), and derives its mandate from the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)*" – SANBI Annual Report 2015 -16 [11]

4 Inferred Leopard Population

The only possible way to infer any SANBI estimated leopard population size from the data supplied within Notice 75 draft norms and standards is to work back from the hunting quota proposed based on a "*maximum sustainable harvest rate of 3.6%*" (given at Figure 4 below)*.

Province	Year of "population density" - *Swanepeol et al (2014)* [2]	SANBI Proposed Male ≥7 years Hunting Quota 2017	Inferred Male Leopard Population[1]	Inferred Leopard Population[2]	Trophy Hunting *Swanepeol et al (2014)* [2] *2010*	Damage Control Animal *Swanepeol et al (2014)* [2] *2010*
Eastern Cape	2007	3	83	276		
Free State	?	0	?			
Gauteng	?	0	?			
KwaZulu-Natal	2005/2006	9	250	833	5 (male)	8
Limpopo	1972 – 2010	59	1,638	5,460	50 (10 male, 5 female, 1 sub-adult female, 34 unknown)	63
Mpumalanga	1972	11	305	1,016		
North West	2003 -2007	2	55	183	7 (4 male, 3 unknown)	
Northern Cape	1984	0	?			
Western Cape	1985 – 2007	4	111	370		
TOTAL		**88**	**2,442**	**8,138**	**62**	**71**

Notes: 1 - Based on a "maximum sustainable harvest rate of 3.6%" as recommended by Caro et al (2009) [12]

*2- Inferred male leopard population based on "30%" of male leopards in any population and an assumed maximum of 3.6% males leopards ≥ 7 years old - "60% of the population is mature, (**30% males**, 30% females), 15% sub-adult males and females and 10% juveniles" - Swanepeol et al (2014) [2]*

Figure 4 - "*Proposed annual leopard hunting quota for each province*" and inferred leopard population

The 2,442 male leopards ≥ 7 years old inferred at Figure 4, suggests a much greater leopard population (mature males and females, sub-adults, and juveniles) of 8,138.

The SANBI has not published its own quantitative estimates of South Africa's leopard population.

5   Leopard Population Range Modelled

What does the SANBI/DEA think the leopard population actually is within the provinces and South Africa as a whole?

Swanepeol et al (2014) [2], (Figure 5) has a population range of the total South African leopard population of 2,813 to 11,632. However, the IUCN Red List Data [14] study, "*Panthera pardus – Leopard - The Red List of Mammals of South Africa, Lesotho and Swaziland*" suggests caution:

> "*Such large variance makes quantitative interpretation difficult and thus these data can only be used as a rough guideline of the South African Leopard population. Caution should therefore be applied when using these data quantitatively (for example, to set hunting quotas)*" - IUCN Red List Data [14]

Table 1. The range of leopard population sizes and maximum levels of trophy harvest and retaliatory killing used for the simulations for each South African province.

Province	Population size[a]		Trophy harvest Maximum[b]	Retaliatory mortality Maximum[c]
	Minimum	Maximum		
Limpopo	1682	7168	204	348
Mpumalanga	338	1851	32	169
North West	174	255	40	54
Gauteng	25	31	4	8
Northern Cape	68	262	14	27
Free State	8	26	4	8
KwaZulu-Natal	247	1120	20	118
Western Cape	200	619	32	65
Eastern Cape	71	299	16	33
South Africa	2813	11632	366	826

[a]Minimum and maximum population sizes were calculated by multiplying the lowest and highest recorded density in each major biome by spatially derived explicit probabilities of leopard occurrence derived from a habitat suitability model (Appendix 2, Appendix 3).

[b]Represents four times the maximum recorded trophy harvest per year over the period 2002–2010 (Appendix 4), or for provinces without existing harvest the average proportional harvest based on the provinces with existing harvest. Minimum levels were set to zero for each province.

[c]Represents the maximum number of damage-causing leopards killed or translocated per year over the period 2002–2010 (Appendix 4) and an estimated number of illegally killed leopards. Minimum levels were set to zero for each province.

Figure 5 - from Swanepoel et al (2014) [2]*, "The range of leopard population sizes and maximum levels of trophy harvest and retaliatory killing used for the simulations for each South African province."*

In 2008, (Leopard (Panthera Pardus) Case Study (2008) [3]) the following (negative) assessments were made regarding South Africa's leopard population (the question is, what has improved since?):

"The Leopard population size in South Africa is unknown, but it has however, become apparent that Leopard populations are smaller and more fragmented than previously appreciated."

"There is generally poor information on Leopard population because of censusing difficulties. As a solitary and nocturnal animal Leopards are not easily seen. The more successful methods of determining Leopard numbers are spoor counts and camera traps. The spoor count technique is used to determine presence/absence as well as the assessment of numbers using indices. This technique is only effective with high "detectability" of tracks e.g. sandy environments and special tracking skills are needed. Camera traps are also used to determine presence/absence data and monitoring trends."

The leopard population estimated within Leopard (Panthera Pardus) Case Study (2008) [3] (given at Figure 6 below), suggests a leopard population within South Africa across the core areas assessed as between 2,185 – 6,780 (best estimate of 4,987).

Population Area	Est. Population Size			Sat. Level	Est. K_{Best}
	Min.	Best.	Max.		
Great Kruger	750	1200	1500	100%	1200
Northern Limpopo	500	1250	2000	80%	1563
Waterberg & Mpumalanga	400	850	1600	80%	1063
Northern KwaZuku-Natal	200	400	600	90%	444
Kalahari	30	50	70	90%	56
Orange River	20	30	60	50%	60
Western Cape	200	350	600	80%	438
Eastern Cape Mountain	35	40	80	65%	62
Eastern Cape Valley	30	50	150	70%	71
Wild Coast	20	30	120	100%	30
TOTAL	2185	4250	6780	86%	4987

Figure 6 – *"Population and carrying capacity estimates for each of the 10 identified core Leopard habitats in South Africa" -* Leopard (Panthera Pardus) Case Study (2008) [3]

So, in order to set hunting quotas, what quantitative leopard population data has the SANBI actually used and applied with Notice 75 draft norms and standards?

Does the SANIB 'know' what the % of male leopards ≥ 7 years old is per province? If so, why have the figures not been released in full within Notice 75 draft norms and standards with the actual 2017 science and backing behind it? The only exception being a claim from a 2013 study in the Sabi Sand GR (Balme et al., 2013) [13] had "*a male leopards ≥ 7 years old comprised 10-16% of the study population*" – the cited report remains elusive for examination:

- What is the actual scientifically proven split within any province's leopard population where "*60% of the population is mature, (30% males, 30% females)* (Swanepeol et al (2014) [2])" - how many of the "*30%*" of mature adult males are ≥ 7 years old? Has the SANBI just

assumed that "*30%*" of mature adult male leopards sub-set encompasses ≥ "*3.6%*" male leopards ≥ 7 years old?

- If an assumption is being used by the SANBI of how many of the "*30%*" of mature adult males encompasses male leopards ≥ 7 years old, then this leads to an inferred leopard population (reference Figure 4) within South Africa of some 8,138 leopards (based upon a "*maximum sustainable harvest rate of 3.6%*") – This inferred leopard population is substantially higher than the maximum given at Leopard (Panthera Pardus) Case Study, (2008) [3] (Figure 6).

6   Maximum Sustainable Harvest Rate

This "*maximum sustainable harvest rate of 3.6%*" is referenced by the SANBI as taken from Caro et al (2009) [12] which states (at para 3.3) that this is a recommendation of a dual sex model based on male leopard "*harvesting*" where "*if we add a 30% incidental take of adult females, the sustainable [leopard population] offtake is reduced to 3.6% [from 3.8%]:*"

- The Caro et al (2009) [12] model cited is based on "*harvesting*" adult male leopards (of various mature ages), with potential incidental adult female take;

- The SANBI needs a model for a "*maximum sustainable harvest rate*" scientifically proven as specific to the proposals within Notice 75 draft norms and standards – male leopards ≥ 7 years old? The Caro et al (2009) [12] model cited is not male leopard ≥ 7 years old specific. So how does the SANBI know what "*maximum sustainable harvest rate*" should be when applied to "*harvesting*" male leopards ≥ 7 years old if the Caro et al (2009) [12] model is inappropriate?

- The Caro et al (2009) [12] model is based on studies in Tanzania – how is that applicable to the terrain, prey density, mortality rates or stochastic incident etc. of South Africa?

7 Main Threats to Leopards

The main threats to the leopard identified within the Leopard (Panthera Pardus) Case Study (2008) [3]:

- At para 1.5.3 - threats were identified as *"Habitat Loss/Degradation, Harvesting [hunting/gathering], Persecution (e.g. Pest control) and trade (illegal and legal) and habitat fragmentation."*

The main problems, challenges or difficulties found on the elaboration of non-detrimental findings within the Leopard (Panthera Pardus) Case Study (2008) [3]:

- Ineffective monitoring of leopards and data management by authorities (data accumulation, collation, access, interpretation and availability);

- Lack of capacity and resources in government to implement effective monitoring of leopards and to implement legislation to control the illegal offtake.

The IUCN Red List (*Pathera pardus – "Vulnerable"*) leopard population data that does exist indicates that across sub-Saharan Africa, a decline of over 30% has been noted over the past 25 years, with some 67% of the leopards' historic range lost. All of this data points to a downward trend, with threats and pressures that are unlikely to relent - such as habitat loss due to human population growth/land demand, prey decline. The downward trend in leopard populations includes South Africa:

> "*Numbers of sub-Saharan Leopards are declining within large portions of their range, particularly outside of protected areas. The populations within Angola, Zambia, Mozambique, Zimbabwe and South Africa appear to be decreasing from previous estimates with Leopards disappearing from areas with increased human development and areas of intensive conflict with humans (Hatton et al. 2001, du Toit 2004, Fusari et al. 2006, Lindsey et al. 2014)*" - IUCN Red List (*Panthera pardus*)

The African leopard (*Panthera pardus*) face numerous threats (including hunting):

> "**The population of leopards within South Africa is under threat due to habitat loss through agricultural development and human population encroachment in their ranges. The other

*threats are illegal and legal trade of leopard goods, hunting by humans and poisoning. Leopard skins and canines are widely traded domestically in some central and West African countries where parts are used in traditional rituals and sold openly in villages and cities. Leopards may be hunted and poisoned by humans in defence of their livestock. The trophy hunting of female leopards may have a significant impact on the demographic and population level of leopards within an area***" -* SANBI

"Our results call for concern regarding the sustainability of the South African leopard population. Although our simulations suggested that the extinction risk of the South African leopard population was negligible within the next 25 years, we found an unequivocal risk of population decline in South Africa as a whole as well as for several provinces" - Swanepeol et al (2014) [2]

"Leopards are not only harvested as trophies, but are persecuted as a result of human-wildlife conflict in which Leopards are blamed for livestock losses and depredation, often not as a result of the Leopard but other carnivores (including domestic dogs). They are also persecuted in response to competition for resources as they compete directly with people on commercial game farms for their natural prey (wild ungulates). The harvesting or persecution of Leopards is not seasonal but may increase (in the case of human-wildlife conflict) in breeding seasons due to increased conflict" - Leopard (Panthera Pardus) Case Study (2008) [3]

Concerns over the sustainability of leopard trophy hunting in South Africa was raised by Balme et al (2009) [1] ("*Impact of conservation interventions on the dynamics and persistence of a persecuted leopard (Panthera pardus) population*") - also summarised at reference Swanepeol et al (2014) [2] page 116 as:

"These concerns are founded in a doubling of the harvest quota since 2005 (75 to 150 animals), as well as increased incidents of legal and illegal retaliatory killing (Daly et al. 2005). Coupled with recent concerns that poorly managed trophy hunting may be partly responsible for declining leopard populations (Balme e t al. 2009; Packer e t al. 2011), there thus appears to be a need for a formal evaluation…."

How can any such "*evaluation*" of concerns over the sustainability of leopard hunting in South Africa be seen to have abated if Notice 75's draft norms and standards, Appendix 1 provides no means to assess the credibility of the actual, quantitative 2017 leopard population data the SANBI has used to arrive at its proposed hunting quotas with Notice 75 draft norms and standards?

I don't believe the SANBI/DEA has proved within Notice 75 draft norms and standards that any of the above threats have been considered and/or addressed.

8   Trophy Hunting's Contribution

The argument used that trophy hunting income is essential to ensure local communities are encouraged to tolerate wildlife is scientifically unproven:

- As little as 3% of hunting income trickles down to local communities, so wildlife is treated by communities regardless of any such meagre trickle down, sometimes well, sometimes not (reference "*The $200 Million Question*," Economists at Large, 2013 [15]);

- "*New report reveals big game hunting makes minimal contribution to African economies and jobs*," Humane Society International, 1 February 2017 [16] and "*The Lion's Share*," Economists at Large, 2017 [17] – Compared with general tourism, hunting contributes very little in comparison:

    o   Tourism vs Hunting income to South Africa:

        ▪   Visitor numbers (mean 2003 – 2013) – Table 2 [17]:
            • Hunting visitors – 8,387
            • Tourism visitors – 9,360,000

        ▪   Contribution to South Africa's @ GDP $349.9bn USD (2014) – Table 5 [17]:
            • Hunting - $141.2m USD (2015) - 0.04% of GDP
            • Tourism - $12.4bn USD (2014) - 3.5% of GDP

        ▪   Employment contribution – Table [17]:
            • Hunting's share of tourism employment in South Africa – 0.88%

How does trophy hunting's financial contribution of 0.04% of South Africa's GDP (2014) [17] offset the risks of the negative impacts of trophy hunting that are unproven as "*not detrimental to the survival of the species?*"

9   Baiting

How is the baiting (*"Most leopards in South Africa are hunted over baits at a distance of 50-80m"* - Notice 75 norms and standards, Appendix 1) of leopards so they can be executed for trophies in any way honourable, noble, sporting, ethical, moral, or acceptable?

References

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[17] Economists at Large, "The Lion's Share," Economists at Large, Melbourne, 2017.