NDF WORKSHOP CASE STUDIES
WG 5 – Mammals
CASE STUDY 1
Panthera leo
Country – **TANZANIA**
Original language – English

NON-DETRIMENT REPORT UNDER CITES REGARDING THE EXPORT OF AFRICAN LIONS *PANTHERA LEO* FROM THE UNITED REPUBLIC OF TANZANIA

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I. Background information on the taxa

1. BIOLOGICAL DATA

1.1 Scientific and common names

Scientific; *Panthera leo maasaica* (Neumann, 1900)
Common names: African lion (Eng), Simba (Swahili).

1.2 Distribution

The African lion is the largest of Africa's large carnivores and once one of the most wide spread species. Lions inhabit all the major habitats of the continent where there is stable prey base, water, and minimal human disturbance. They have been recorded throughout the vast savannas, woodlands and bushlands of east and southern Africa and in central and West Africa. Lions are present in 34 range countries today, with a permanent presence in 32 and occasional in 2. Records by Bauer, Chardonnet and Nowell (2005) indicate the disappearance of lions in 6 countries over the recent past. Figure 1 (*ANNEX I*) shows the past and recent lion distribution in Sub-Saharan Africa.

Estimates by Chardonnet (2002) show a current continental lion distribution range of approximately 3 million km^2. Fifty percent of the range is gazetted and with some form of conservation status such as

National Parks and the rest (50%) is just open, ungazetted wildernesses. East Africa holds approximately 40% of the lion range while 35%, 22% and 4% fall within Southern Africa, Central and West Africa respectively.

1.3 Biological Characteristics

1.3.1 *Summary of general biological and life history characteristics*

African lion is the best-studied terrestrial carnivore in Africa today. Lions are gregarious mammals that live in stable social groups or prides that comprise of 2-30 individuals; with a composition of 2-18 adult females, 1-7 adult males and juveniles and cubs born in the pride. Reproduction in lions is non seasonal and occurs approximately once in every two years and generally takes place after individuals in the previous litter reach their second birthdays (Van Orsdol *et al*, 1985). Pride females conceive and give birth in synchrony to litters of 1-4 cubs after a gestation period of 90-110 days. Cub survival rate is 50-75% in the wild (Serengeti NP and Ngorongoro Crater). Maturity is reached at the age of 3 years, but reproductive opportunities are obtained much later in both sexes (Packer *et al*, 1988). Females begin breeding in between their 3-4 birthdays and males do not gain reproductive status until around their fifth birthdays (Packer *et al*, 1988). The difference in males is due to a solitary phase (2-4 yrs) when males undergo nomadic life after dispersal from their natal prides. All the females are born within the pride while males are newcomers that are born in other prides and gain access through successful 'pride takeovers'. Prides occupy territories of varying sizes (5-400 km^2) that depend upon the availability of food, shelter, and water (Heinsohn and Packer, 1995). Females defend the resources within territories against other female intruders while males do the same against other males.

1.3.2 *Habitat types*

Lions inhabit all the major habitats of the continent where there is stable prey base, water, and minimal human disturbance. They have been recorded mostly throughout the vast savannas plains and woodlands and bushlands of east and southern Africa and in central and West Africa and even extreme environments such as the Kalahari Desert in Namibia and high montane forests of Mt. Kenya in Kenya.

1.3.3 *Role of species in the ecosystem*

Within ecosystems, lions are top predators and keystone species that help regulate and maintain large herbivore populations in balance with nature.

Large volumes of literature on the conservation status, ecology, behaviour and human conflicts exist. For more information on these topics, please refer to Chardonnet (2002), Pusey and Packer (1993), (Heinsohn and Packer, 1995), Packer *et al* (2005) and Ikanda and Packer (2008).

1.4 Population

1.4.1 *Global population size*

Precise global population numbers of African lions are not known due to the difficulty involved in census techniques. Recently Bauer and van der Merwe (2004) and Chardonnet (2002) have attempted to make inventories of lions by country, ecosystem and unprotected/non-gazetted areas, thus giving estimates of total global population size. Their methods involved reviews of local census data (12-30% of inventory) on key well-studied populations through questionnaires and communications with national authorities, scientists and consultants. In areas where such data was not available, Chardonnet (2004) applied educated 'quessestimates on numbers by making extrapolations from similar ecosystems (in terms of natural habitat and human density) (25%) and secondary data (63%). These two studies provide the best available figures on global numbers of lions that put recent estimates in the range of 16,500 – 47,000 (Chardonnet, 2002; Bauer and van der Merwe, 2004).

1.4.2 *Current global population trends*

___increasing __X__decreasing ____stable ____unknown

Fewer lions survive today in the wild and records indicate a continuous decline, primarily due to habitat/range loss (30-50%) in the last 2 decades (Nowell and Jackson, 1996). Continued changes in land-use practices that lead to lion habitat loss and fragmentation (Frank and Woodroffe, 2001; Sunquist and Sunquist, 2001), (Nowell and Jackson, 1996; Bauer and van der Merwe, 2002), sanctioned human persecution (Frank 1998, Packer *et al*, 2005, Ikanda and Packer, 2008) are identified as the principal causes for decline. The remaining lions live mainly inside protected areas in the plains and woodlands of east and southern Africa. Small and isolated populations survive in scattered protected areas of west and central Africa (Bauer and van der Merwe, 2002). A few continue to survive outside protected areas, but at much lower densities and in isolated and fragmented habitats of East Africa (Frank, 1998, Baldus, 2004).

1.5 Conservation status

1.5.1 *Global conservation status*

___Critically endangered
___Endangered
_X_Vulnerable
___Near Threatened
___Least concern
___Data deficient

The African lion is currently listed as *vulnerable* by the IUCN and its trade is regulated pursuant to its listing and its trade is regulated pursuant to its listing under Appendix II of Convention for the International Trade in Endangered Species (CITES) (Nowell and Jackson, 1996).

1.5.3 *National conservation status for Tanzania*

Tanzania is home to a high number of lions, owing to its extensive network of Protected Areas (PAs) and large tracts of relatively undisturbed wild lands that adjoin and extend well beyond PA boundaries (Figure 1). Lions are found *wide spread* in virtually all PAs in Tanzania, whether on temporal and spatial scales, supported by the immense abundance of wild ungulates populations found within. National Parks and Game Reserves form *core lion areas* and are also *common* in Game Controlled Areas, Open Wilderness Areas/Wildlife Management Areas and Forest Reserves that serve as the main buffer zones (semi-PAs status). Country wide 8 known populations have been directly estimated in National Parks and Game Reserves through ecological monitoring and research, giving a figure of approximately 13,000 lions. The primary method of estimation is based on the long-term monitoring of known individuals (lions) that are identifiable individually by their unique and distinct facial markings such as whisker spot patterns, ear notches and scarring (Schaller 1972, Hanby and Bygott, 1979, Packer 1990, Creel & Creel 1997, Ikanda, 2006). Secondly they have been counted using playback calls (Viljoen and TAWIRI *unpubl* and Kiffner (2006)) and lastly using line transects and estimated using DISTANCE in large open terrains such as the Serengeti open grassplains (Durant *et al* 2003). Combining the figures together with other indirect measures using indices done by Chardonnet (2002) for the rest of suitable lion-habitats in Tanzania gives an estimated minimum number of 18,215 lions for entire Tanzania.

Outside PAs lions continue to survive and their interactions with humans are high (Packer *et al* 2005). Little is known of the past abundance, however historical tribal tales and legends suggest fewer lions survive today than did in the past 50 years.

1.5.3 *Main threats within Tanzania*

___No Threats
_X_Habitat Loss/Degradation (human induced)
___Invasive alien species (directly affecting the species)
___Harvesting [hunting/gathering]
___Accidental mortality (e.g. Bycatch)
_X_Persecution (e.g. Pest control)
___Pollution (affecting habitat and/or species)
___Other_____
___Unknown

Threats to Lion in Tanzania are limited/reversible.

Persecution

There are four types of non-natural mortality of lions in Tanzania on the based on research records, District Problem-Animal files and Wildlife Division Hunting records; Problem-animal control (PAC), ritual hunting, tourist hunting and road kills (e.g. Mikumi highway and TAZARA railways and Mtwara-Lindi highway). Road kills do not occur in significant numbers and can easily be disregarded. Tourism hunting is regulated and affects a demographic segment of the population, thus having minimal impacts. The former two, however, pose significant threats to the survival of lions in Tanzania. Numbers out of the four types of non-natural mortality are not considered when setting quotas, with the exception of tourist hunting records, main reason being that mortalities occur in significantly far distances from harvested populations to have any significant impacts, even though some places may increasingly be forming population sinks.

Problem-animal control

Records from 7 high human-lion conflict districts indicate minimum annual losses of 15 lions due to PAC resulting mainly from attacks on humans (Ikanda and Mduma, *in prep*). Lion PAC resulting from livestock depredation is even more difficult to quantify and measure as it is mostly done by closed pastoralists societies, located in highly remote areas (where events are seldomly reported to wildlife authorities). Studies by Maddox (2003) and Ikanda (2006) for the Ngorongoro Maasai rangelands and Kissui (2008) for the Greater Tarangire-Manyara Maasai rangelands indicate annual offtakes of 30+ (1% of population) and 40+ (10% of population) lions respectively through ritual hunting. District Government records (Unpublished), Wildlife Division Records (Unpublished) and studies by Ikanda and Mduma (in prep) indicate annual losses of 3-7 lions in other pastorilist-dominated

landscapes through PAC, especially in central Tanzania. Combining all figures, approximately 73-77 lions are persecuted annually through PAC in high human-lion conflict regions of Tanzania. These figures were gathered through participatory research and matched against estimated local population sizes to determine impacts. Kill data was gathered through reviews of government records and field research (PRA) and figures summed up per district/location. In locations where population abundance is known, figures were then matched up with population size in order to determine impact levels.

Ritual hunting
Ritual hunting is illegal and the single most illegal-form of lion harvest in Tanzania. The practice is done by pastoralist societies inhabiting open rangelands, in often highly remote and extreme environments. Each year young warriors from the *Maasai* (northern Tanzania) and *Barbaig* (central) pastoralist communities kill lions with spears-in display of bravery and courage-as a necessity for their 'right of passage' into manhood. Nevertheless, the practice goes on unabated due to high secrecy behind these communities; and even when detected by authorities, the events may easily be framed and disguise acts of retaliatory (PAC) killings due to livestock theft (depredation).

Habitat loss in Non-Gazetted Areas
Tanzania has a significant number of lions living outside its PAs network, in large expanses of *ungazetted* open wilderness rangelands. Until recently these have served as suitable lion habitats due to low human presence and activity. However, it is within these same habitats today that an increasing rural population (at a rate of 3.5-4% annually) is expanding to with adverse effects on biodiversity, especially pastoralists. Human-lion encounters and conflicts are increasing due to space and resources competition on open rangelands.

2. SPECIES MANAGEMENT WITHIN TANZANIA

2.1 Management measures
Lions are protected throughout the country, and it is the policy of the Government to conserve them both inside and outside protected areas as part of the countries biological heritage (Wildlife Conservation Act, 1974). Lions are managed within the context of the ecological systems in which they occur, on the basis of General Management Plans (GMP), in all National Parks and Game Reserves and in the future also at the GCAs and OA/WMA.

The only exception is in defence of life and property. Lions may be killed at any time where they are deemed a threat to life and, or property (Wildlife Conservation Act, 1974).

2.2 Monitoring system

2.2.1 *Methods used to monitor harvest*

RANKED- QUANTITATIVE

The Wildlife Division monitors harvesting of lions through its quota system. Hunting companies are obliged to show the number of lions they shoot each hunting seasons through hunting returns, these numbers are verified by records from local wildlife officials (Park managers and District Game Officers) who supervise all hunting. Furthermore, harvesting is also monitored through an trophy export permit system; as lions are harvested for trophy by foreign tourists hunters that must export them. This system also enables the monitoring for quality of trophies using several verifiable indicators (e.g. trophy quality, age etc.). Records mainly used by authorities to monitor hunter's adherence and compliance to regulations, especially on sex biased harvesting and set minimal ages of lions harvested.

2.2.2 *Confidence in the use of monitoring*

RANKED-MEDIUM

Each export of lion trophy requires an export permit that enables the Wildlife Division to monitor harvest. As African lions area a CITES listed species, it can be expected that a high level of international scrutiny will be applied to international trade in the species.

Wildlife Division has many years of cumulative experience of setting quotas that relies on several verifiable indicators (population estimates, trophy quality, age, abundance, offtake levels etc.) that can demonstrate little or no significant detrimental impacts on the wildlife populations provides the bench mark that allows for the confidence of setting future hunting quota through an adaptive management approach.

2.3 Legal framework and law enforcement

Harvesting of lions in Tanzania is controlled through the Wildlife Conservation Act (1974) and Hunting Regulations (2002). The Wildlife Conservation Act ensures there is no resident hunting of lions, whether for trophies, medicinal or other forms of trade and ensures the protection of lions outside PAs. It is thus illegal for any body to be

found with lion parts. Tanzania's Zonal Anti-poaching Units (APU) enforce the law under the Act.

Harvesting of lions is only allowed in designated tourist hunting areas as stipulated under the Hunting Regulations (2002). Hunting permits to shoot lions are issued by the Director of Wildlife for each hunting company and hunting clients are obliged to be accompanied by a Government Wildlife Officer, who ensures their quotas are not exceeded and compliance of the full extent of the Regulations.

3. UTILIZATION AND TRADE FOR TANZANIA

3.1 Type of use and destination

RANKED-TROPHY HUNTING

In some wildlife PAs categories e.g. Game Reserves, Game controlled Areas, Open Areas/WMAs, lions are utilized consumptively through *tourist hunting*. Here 1.4-12.3% (average 6 %) of the male population (Baldus, 2004) is harvested commercially annually and exported as trophies mainly to the US and EU countries. Proportion of males were determined from 3 well studied populations in the Serengeti, Ngorongoro and Selous GR and were found to have a mean ratio of 18%. This figure was multiplied against each population estimate for each ecosystem to obtain approximate male population sizes. Mean numbers (2000-7) of lions harvested for each ecosystem were then divided by estimated male population numbers in order to obtain harvested proportions per each ecosystem.

Utilization is exclusively (100%) on wild specimens.

3.2 Harvest

3.2.1 *Harvesting regime*

RANKED- EXTRACTIVE, DEMOGRAPHIC SEGMENT ONLY.

Harvesting is *extractively* and strictly administered under a national quota system set and controlled by the Director of Wildlife. Quotas are restricted to adult males (preferably of 6+yrs) only. Approximately 320 lion quotas in total are issued to hunting block concessions in Tanzania annually. The outfitter of the concession than sell the hunting experience and lion trophies to clients based upon quotas issued for their particular hunting blocks. To hunt lions, clients purchase 21-day safari permits, lion trophy fees and export fees for each lion. In the field, outfitters are obliged to make sure clients are accompanied and assis-

ted by professional hunters and government game rangers (mainly for safety and compliance purposes).

3.2.2 *Harvest management*

Lions are harvested in designated hunting areas under Tanzania's PAs categories of Game Reserves, Game Controlled Areas and Open Areas/WMAs. Hunting areas are divided into 158 hunting concessions that are leased by the Wildlife Division to hunting outfitter/operators. Hunting outfitters are issued quotas of 0-5 lions annually and these form the limits to the number lion trophies they can sell to clients. Government game rangers are further assigned to each client in order to make sure quotas are not exceeded. Lastly, harvested trophies are exported out of the country through a permit system. At the end, export permits from departing tourist hunters must reflect the hunting outfitter's identity and his 'baggage size' or quota. Finally, harvesting is time-managed, strictly conducted over a six-month period that effectively commences on July1st to December 31st each year. This period coincides with the dry season in Tanzania when wildlife species are easily visible and less mobile for harvest management. At the end of the season, hunting companies must submit their hunting returns to the Wildlife Division upon which records of annual harvests are made.

Approximately a quota of 320 lions- is issued for harvesting in all hunting blocks annually. Quotas are set (unscientifically) by the MA and were provide to us as figures only-for each hunting block/concession.

Harvest Analysis

Records of issued lion quotas (annual) and corresponding hunting returns (see Harvest management above) were collected for hunting blocks from the Wildlife Division in Dar-es Salaam. Quotas were not calculated; they were set (non scientifically) and provided by the MA. Due to observed gaps in the data and computerization, records were restricted to coverage of 89% (n=158) of hunting blocks and for the period 2000-7. The spatial-temporal data was captured onto a computer database to enhance analysis. Furthermore, as hunting takes place in 6 major populations (mainly the Selous, Maasai steppe, Great Ugalla comprised of Rukwa, Rungwa and Moyowosi areas and the Serengeti surrounds), analyses were conducted separately for each these as ecosystems (*see* Map in Appendix II) in order to better assess and detect local harvest impacts.

Using *Standard linear regression* (Model I Regression) the form and strength of relationship between lion quotas and harvests was analy-

zed for each of the ecosystems for the period of 2000-2007. The main assumption was that if harvest levels are detrimental to the populations then quotas should show statistically significant *inverse* relationships with offtake levels; on the assumption also that harvest efforts were 100% and hunting companies strictly adhered to their bag limits (quotas). Findings indicate statistically significant, strong positive relationships in the two variables for Selous (r = 0.634, p=0.00), Maasai steppe (r = 0.624, p = 0.003), Great Ugalla-Rungwa complex (r = 0.647, p = 0.007), Moyowosi complex and Serengeti surrounds (r = 0.868, p = 0.05). There was no significant relationship of the two variables for the Rukwa complex part of the Great Ugalla ecosystem, though there is still a positive relationship. Findings suggest non-detrimental effects in lion harvest levels in Tanzania for the period 2000-2007. Visual presentations of the findings are given in *ANNEX III*.

A mean number of 192 lions, under mean quota of 320 were harvested in the period meeting 63.3 % of harvest requirements. From the data (assuming 100% harvest effort-marketing+hunting), it can be discerned that lion quotas were relatively high, even though trends showed positive linear relationships.

3.3 Legal and illegal trade levels

Legal Use Nationally

There is no resident hunting of lions in Tanzania, which includes licenses for traditional lion hunting or to obtain lion products for traditional medicine. Ownership of any item deriving from wildlife including lion must be proven with an ownership certificate that is only provided in the case of legal acquisition.

Illegal Use Nationally/Internationally

Illegal harvest and trade in lion body parts are rare nationally (9 skins impounded between 2000-7), making it difficult to estimate through meaningful quantitative measures. These numbers are not considered when setting quotas, as numbers are regarded low and insignificant. Records from 9 districts show a minimum of 9 lion skins were impounded by authorities between 2000-2007 (Pers observ). Incidents are always difficult to measure, and it does not come as a surprise that the exact number of lions lost due to illegal acts in Tanzania is unknown. The highest losses are attributable to the pastoralists of northern and central Tanzania, e.g. the Maasai and Barbaig.

II. Non-detriment finding procedure (NDFs)

1. IS THE METHODOLOGY USED BASED ON THE IUCN CHECKLIST FOR NDFs?

__yes __X_no

2. CRITERIA, PARAMETERS AND/OR INDICATORS USED?

The approach used by the Wildlife Division to allocate quotas is to rely on the knowledge of Project Managers and District Game Officers who suggest quotas for the Game Reserves and Game Controlled and Open Areas respectively. Aerial survey data are taken into account (where available) together with past hunting records and recommendations of professional hunters and outfitters. As such, the setting of lion quotas is on the basis of the following parameters:

1. *Population abundance*- Population estimates of lions per Game Reserve or Open areas are not available for the Wildlife Division so review panels rely on the recommendations of Project Managers (Chief wardens of GRs) and District Game Officers (OAs) as well as professional hunters and Hunting outfitters who have best local knowledge on local lion abundance. These recommendations then provide the basis for setting future quotas.
2. *Trophy quality and age*- Trophy quality is assessed by the type (black. Tawny) and length/coverage of the mane. The mane is also used as an indicator of age (as length and quality increases with age). Trophy quality of harvested animals is observed in the field by Project managers and District game officers and recommendations given to review panels for future quota setting. Further evaluation is done by the Wildlife Division prior to trophy export. However, studies by Whitman *et al* (2004) with field data from Tanzania demonstrated through modelling that harvesting only lions of six years and older is not harmful to a normal lion population. Aging in the field is based on nose colouration; from bright pink (young) to freckled-black/ black (adults 6+yrs) Based on their results, the Wildlife Division is considering a system of discouraging the export of lion trophies from animals less than six years old. These records will also be applied in setting of quotas.
3. *Past offtake levels*- Perhaps this is the primary base from which future quotas are gauged and set. The extent to which past quotas have been met (harvest levels) are assessed effectively and the cumulative experiences obtained over past years form criteria of setting future ones.

No proper quantitative data exists within the Wildlife Division for conducting rigorous harvest analyses using criteria 1 and 2. Therefore harvest analyses are based upon criteria 3, and the main assumption is that negative impacts of harvest in a quota-based system should be manifested in the returns (number of hunted lions) against quotas in a linear relationship. Under the current system, all hunting outfitters are obliged to report back to the Wildlife Division the number of lions harvested per given quota. Usually this is done after the end of a hunting season in the form of 'hunting returns' and must be reported before commencement of the next hunting season. Returns reflect the date, location and number of harvests for each hunting outfitter. Both sets of records were collected from the Wildlife Division and compilations of all outfitters' records in a given ecosystem give a record of harvest for that specific region.

3. MAIN SOURCES OF DATA, INCLUDING FIELD EVALUATION OR SAMPLING METHODOLOGIES AND ANALYSIS USED

The main source of data for the NDF is the Wildlife Division hunting records.

Lion population Abundance

No proper quantitative data exists within the Wildlife Division on lion population abundance. This is due to the fact that the primary method of animal census by the Wildlife Division is aerial surveys, which are inconsistent due to costs, are ineffective for species such as lions and are only useful in providing population trends. Few hunting outfitters have attempted to census lions on their concessions, but the figures represent too small sample proportions of ecosystems to provide for any meaningful statistical analysis.

Lion trophy quality

Likewise, no proper quantitative data on trophy quality is available at the moment. As such, this type of data was excluded from the analysis.

Past harvest records/returns

The Wildlife Division sets and distributes all lion quotas to all hunting concessions/outfitters on an annual basis- prior to commencement of hunting season. In return, at the end of every hunting season the hunting companies are obliged to submit their hunting returns to the Wildlife Division. Records are then kept on annual quotas and annual returns for all hunted species annually. We gathered both sets of data for lions on all hunting companies between 2000-7. Standard linear regression analyses were used to determine relationships between,

and 'cause' and 'effects' of present quotas on harvest levels. To better evaluate the impacts, this analysis was scaled down to ecosystem levels where a total of 6 lion populations (in 5 ecosystems) were assessed.

Further analysis was done to estimate proportions of the population offtake per year in order to draw on a broader picture.

4. EVALUATION OF DATA QUANTITY AND QUALITY FOR THE ASSESSMENT

No rigorous evaluation of the data was done. However, a few points are worth noting regarding the data. The data is strictly maintained by the Wildlife Division and is not accessible to the public. Records used reflect lion harvest for up to 89% of hunting concessions. Although such records exist for previous years, computerized data records existed basically from 1995 upwards. More complete records exist for the period of 2000-7, hence restricting analyses to this period.

5. MAIN PROBLEMS, CHALLENGES OR DIFFICULTIES FOUND ON THE ELABORATION OF NDF

The main difficulty in conducting this NDF revolves around accessing properly arranged (computerized) data and other relevant records from management authorities. This exercise could have been made much simpler if records were properly kept and updated with ongoing changes, especially data on license returns. For the case of Tanzania all data needs to be entered into a computer immediately.

It is also worth mentioning that there are needs for more training on the NDF procedures to SA. Much time is spent in trying to determine how the procedure is carried out.

6. RECOMMENDATIONS

NDFs are a powerful tool in conserving species under CITES Appendix II category if applied properly. Proper applications maybe limited due to a) lack of proper recording keeping by MA, and 2) lack of technical knowledge on conducting NDFs. It is herby recommended that CITES Secretariat should explore ways in which there can be training to MA on data keeping and training also to SA on NDF procedures. Special focus should be on species range states.

CONCLUSIONS

An overview of the African lion harvest management system has been prepared using the draft format by the International Workshop on CITES non-Detriment Findings. Populations of P. leo have suffered dramatic declines throughout their global range in recent times. Tanzania holds the largest population that benefit from a widespread network of protected areas (30 % of the country) and from vast tracts of unpo-

pulated and populated lands with relatively undisturbed habitats suitable for lions. Lions play a major role in the hunting industry; it is the major source of revenue that sustains the game reserves and game controlled area network in the country.

The harvest management regime in place insures that no lions are hunted by resident hunters and that only tourist hunters are permitted and in designated areas. The regime also insures that the tourist hunter's harvest is limited (in quantity and quality) by a quota system. Approximately 193 lions were harvested annually from a quota of 320 between 2000-7, meeting 63.3% of harvest requirement. Regression analyses for key lion populations have shown significantly, positive linear relationships between quotas and offtake/harvest. A visual presentation by graphs of relationships between quotas and harvest/offtake are given in *ANNEX II* to show current non-detriment effects in Tanzania. These findings suggest current harvest levels have had no-detriment effects to the lion population in Tanzania.

In conclusion, the requirements for a non-detriment finding are met with the management regime put in place by the Wildlife Division.

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