

# Assessment of sport hunted lion and leopard trophies:

## Guidelines for data collection

Sport hunting is an industry that requires careful regulation and a high degree of compliance with “best practice” standards to ensure it is sustainable. This is particularly important for large carnivore species such as lion and leopard that have recently suffered widespread declines and are sensitive to human disturbance. There is a need to standardize data collected from lion and leopard trophies across their range to allow independent assessment of trophy age, trophy quality, and hunt effort. Such data can enable wildlife agencies to track population trends of hunted species over time and react to changes accordingly. The biological impacts of hunting will also differ depending on the sex and age of harvested individuals, and must therefore be monitored closely. In addition, blood and skin samples can easily be taken from trophies to provide valuable information on disease and genetics in wild lion and leopard populations. These data would add immeasurably to conservation efforts.

Effective monitoring requires collaboration between professional hunters, operators, conservation authorities, and researchers. In this document we provide guidelines on the information and measurements that should routinely be taken from every trophy animal. Some of the information is collected in the field by the professional hunter immediately after the hunt, while other data are collected at a later date by examining the cleaned skull. It requires no technical ability or special equipment other than a GPS, digital camera, and measuring tape; all of which are commonly used by sport hunters.

### Section A: Data to be provided by Professional Hunters/Operators

#### 1. Hunt Return Forms

Information is required on hunting effort and trophy quality. This information is best collected on a printed hunt return form filled in by the professional hunter (PH) after *every* lion and leopard hunt (**i.e. for successful and unsuccessful hunts**). The submission of such forms must be mandatory; these data are only useful if collected in a rigorous and consistent manner. Operators must be penalised for failure to submit forms. The onus is on the operator to ensure all information is sent to the relevant authority by the end of the hunting season. Self addressed envelopes can be provided if postage is necessary.

The following information should be collected (items in italics are not essential):

- |   |  |
|---|--|
| a) Individual ID number (i.e. a number on the questionnaire that can be linked to the trophy - hunt return number, permit number, CITES tag number) | h) Number of baits and bait sites used   |
| b) Name of operator   | i) Was hunt unsuccessful or successful?  |
| c) Name of professional hunter  | j) If unsuccessful: Why?   |
| d) Name of hunting block/property where hunt is undertaken  | k) Date trophy taken / number of days into hunt                                      |
| e) Name of concession holder/property owner   | l) GPS location (in decimal degrees)   |
| f) Name of client   | m) <i>Condition of animal ( snares, wounds)</i>                                      |
| g) Date hunt started and finished   | n) <i>Number of animals seen on baits and off baits during hunt (males, females)</i> |

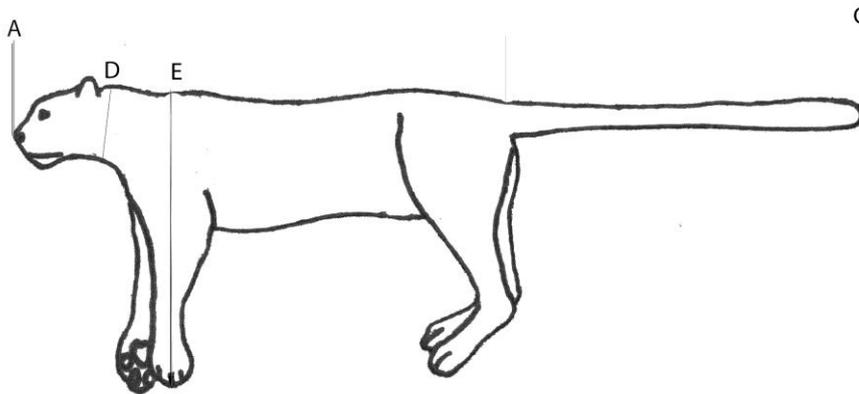
Questions should not exceed one page. An example of a hunt return form is provided in Appendix I.



## 2. Measurements (included on hunt return form)

The following body measurements should be taken for every lion and leopard trophy before the animal is skinned:

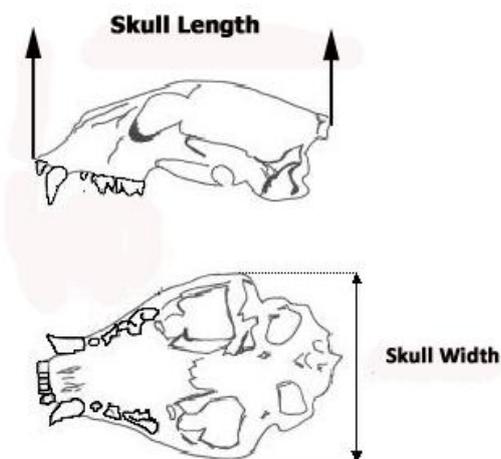
- Body length (cm, tip of nose to tip of tail; Measurement A–C)
- Shoulder height (cm, tip of scapula to end of forepaw; Measurement E)
- Neck circumference - *only for leopard* (cm, immediately behind the ear; Measurement D)



**Figure 1:** Body measurements to be taken for each trophy before skinning.

The following skull measurements should be taken once the skull has been cleaned.

- Skull length (mm, greatest length of skull, measured as a straight line between pegs)
- Skull width (mm, greatest width measured across zygomatic arches)



**Figure 2:** Measurements of skull length and width to be taken for each trophy.

PHs and operators routinely measure skull width and height to provide an SCI rating (width + height in inches); however, the SCI rating on its own is of limited use - the individual metrics in mm are needed to estimate age.

### 3. Photographs

Photographs of the trophy can be used to age hunted lion and leopard effectively. While the traditional photographs taken by clients are useful, more detailed photographs of mane development (in lions), nose pigmentation, and tooth wear are required for reliable aging. They must be taken from the correct angle and at the highest possible resolution. The time and date must be correctly set for digital images. Images must also be labelled/tagged with the individual ID number (as appears on the hunt return form), the name of the operator, the name of the PH, the name of the client, the date the trophy was taken, and the name of the hunting block or property where the hunt was undertaken. Digital images can either be sent via email or placed on a CD and posted with the hunt return form.

#### a) Lion:

Photographs showing body size and condition, mane development, nose pigmentation, and tooth wear must be provided by the PH/operator for every lion trophy. Nine photographs are required (Plate 1a-e and Plate 3a-d). Photographs must be directly from the side (body and mane; Plates 1a, b) or front (head, face, and nose; Plates 1c, d, e); never from an oblique angle (Plate 1f). Nose pictures are best taken with the macro-function setting (which is a feature on most digital cameras) to prevent blurring.



**Plate 1a:** Side view showing the entire body with hunter directly behind for scale. Useful for assessing body size and condition, and basic mane development.



**Plate 1b:** Side view of the head and shoulder showing mane development behind and above the ears, and between the shoulder blades.



**Plate 1c:** Frontal view of the head and chest. Useful for determining mane development on the chest and between the ears.



**Plate 1d:** Frontal view of the face clearly showing facial scarring and the nose from directly in front.



**Plate 1e:** Close up of the nose. These pictures are often blurred if the macro setting is not used. They must be accompanied by a high resolution full face photograph (1d) as a backup.



**Plate 1f:** Not a useful picture as neither body size and condition, or mane development can be accurately assessed.

**Plate 1:** Photographs required from professional hunters/operators to assess body size and condition, mane development, and nose pigmentation for all lion trophies.

## b) Leopard:

Photographs of individual leopard trophies showing body size and condition, nose pigmentation, the hindquarters, and tooth wear must be provided by the PH/operator for every leopard trophy. Nine photographs are required (Plate 2a-e and Plate 3a-d). Photographs must be from the side (body and neck; Plates 2a, b) or front (face, nose, and hindquarters; Plates 2c, d, e). Photographs of a leopard being lifted by the hunter are of limited use (Plate 2f). Nose pictures are best taken with the macro-function setting (which is a feature on most digital cameras) to prevent blurring.



**Plate 2a:** Side view showing the entire body with hunter directly behind for scale. Useful for assessing body size and condition.



**Plate 2b:** Side view of the head and shoulders. Useful for assessing neck circumference and the presence or absence of a dewlap.



**Plate 2c:** Frontal view of the face clearly showing the condition of ears and facial scarring.



**Plate 2d:** Close up of the nose. These pictures are often blurred if the macro setting is not used. They must be accompanied by a high resolution full face photograph (2c) as a backup.



**Plate 2e:** View of the hindquarters clearly showing the presence or absence of a scrotum.



**Plate 2f:** Not a useful picture as neither body size and condition, or neck circumference can be accurately assessed.

**Plate 2:** Photographs required from professional hunters/operators to assess body size and condition, neck circumference, hindquarters, and nose pigmentation for all leopard trophies.

## c) Tooth wear

Lion and leopard can be accurately aged by assessing the colouration and wear of the teeth (in particular, the extent of chipping of the enamel ridge on the back of the canines). This should preferably be done by wildlife officials with the skull in hand. However, it is also possible to do it from photographs if the skull is not available. The angle and quality of photographs are critical if tooth wear is to be assessed this way. Two photographs of each skull are required (Plate 3a, b), while the two additional photographs are useful but not essential (Plate 3c, d).





**Plate 3a:** Lower jaw showing all the teeth and chipping of the enamel ridge on the back of the canines.



**Plate 3b:** Upper jaw showing all the teeth and chipping of the enamel ridge on the back of the canines.



**Plate 3c:** Side view of the lower jaw showing the canine and wear on cusps of molars and premolars.

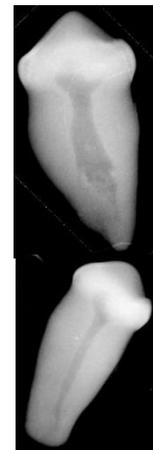
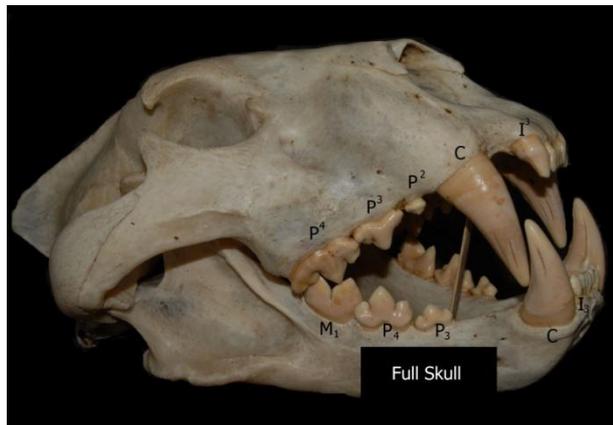


**Plate 3d:** Wide shot of all the teeth showing wear on the canines, broken teeth, and teeth colouration.

**Plate 3:** Images of a lion skull showing the photographs required from all lion and leopard trophies.

#### 4. Removal of single rooted premolar ( $P^2$ ) for x-ray assessment

Post mortem x-rays of teeth can assist with aging trophies - the pulp cavity fills in as lion and leopard get older. The best teeth to remove are the first upper premolars ( $P^2$  in Plate 2) on both sides of the skull. They are small and will not affect the overall appearance of the trophy. They can be removed from the skull using a pair of pliers although care must be taken not to crack the teeth. The teeth be placed in an envelope and sent with the hunt return form. It is essential the envelope is correctly labelled with the individual ID number (as appears on the hunt return form), the name of the operator, the name of the PH, the name of the client, the date the trophy was taken, and the name of the hunting block or property where the hunt was undertaken.



**Plate 2:** Lion skull showing the position of premolar  $P^2$  that must be removed for x-ray analysis of the pulp cavity.

## **Section B: Additional information that can be collected from trophy animals**

Trophy hunted lions and leopards provide a valuable opportunity to collect samples for ongoing conservation research projects. These samples may be particularly important from areas where research is not currently taking place. They can be collected voluntarily by interested professional hunters and provided to researchers for analysis. The onus is on the researcher to provide collection materials, details of how the samples must be collected, and to collect the samples at the end of the season. Accurate labelling of each sample is essential with a GPS location (in decimal degrees), the name of the collector, the species, and the date as a minimum.

### **1. Skin, hair, and scat samples for genetic analysis:**

Genetic samples collected from lion and leopard trophies can be used to assess sub-speciation, estimate population size and dispersal distance, examine connectivity between populations, and investigate inbreeding dynamics. This information is critical for establishing range-wide conservation strategies for large carnivores.

DNA can be collected from the trophy by cutting a very small (3-4 mm) disc of skin (that includes both tissue and hair) from anywhere on the carcass. This can be stored in a small cryotube containing either 95% ethanol or salt. If a sterile container is not available, several hairs can be plucked from the trophy (ensuring the hair root is attached) and placed in a paper envelope.

Genetic material can also be sourced from lion and leopard scat collected by hunters (scat is often found near baits). The best way to handle the samples is to air dry them thoroughly and then to store them individually in sealed plastic bags.

### **2. Blood samples for disease analysis:**

Certain feline diseases such as FIV and canine distemper can be tested from blood samples taken by placing a Whatman blotting (filter) paper on the bullet wound until it has soaked through. The paper is then air-dried for 5-10 minutes and stored in an envelope in a cool place. No special techniques or materials are needed other than the Whatman paper, which will be provided by the researcher.

### **3. Trail camera photographs:**

Many hunters now place trail cameras at baits to assess trophy quality prior to setting a blind. Photographs taken by trail cameras can be used by researchers to identify individuals in an area, estimate the relative abundance and vulnerability of different age cohorts in a population, and assess hunter selectivity. PHs must ensure the date and time information is set correctly on cameras. They should also record the number of cameras that are deployed each day, the number of days that each camera is deployed, and the location (GPS position in decimal degrees) where cameras are deployed.



# Appendix I: Generic hunt return form

HUNT PERMIT NUMBER	<input type="text"/>	CLIENT NAME	<input type="text"/>
PROFESSIONAL HUNTER	<input type="text"/>	HUNTING OUTFITTER	<input type="text"/>
HUNTING BLOCK	<input type="text"/>	CONCESSION HOLDER	<input type="text"/>
HUNT START DATE	<input type="text"/>	HUNT FINISH DATE	<input type="text"/>

1. Was the hunt successful?  YES  NO

If no, why not? \_\_\_\_\_

2. Number of lion / leopard seen during hunt (please provide photographs if possible):

Free ranging:  On baits:

3. Number of baits used (specify number and species e.g. 5 impala, 1 zebra): \_\_\_\_\_

4. Number of bait sites:  5. Number of sites fed on by lion / leopard:

6. Sex and age of lion / leopard on baits (male, female, subadult, cubs) and how determined (tracks, camera-trapped, seen): \_\_\_\_\_

**IF TROPHY WAS TAKEN:**

7. Date trophy taken:  8. Time shot:

9. Location GPS (in decimal degrees):

10. Condition of animal (e.g. thin, fat, parasites, scars, wounds, sick, radio-collared, snare wounds, etc.): \_\_\_\_\_

**MEASUREMENTS:**

11. Skull length (mm):	<input type="text"/>	12. Skull width (mm):	<input type="text"/>
13. Body length (cm):	<input type="text"/>	14. Shoulder height (cm):	<input type="text"/>
15. Neck circumference (mm):	<input type="text"/>		

<b>PHOTOGRAPHS (before skinning):</b>	<b>PHOTOGRAPHS (clean skull)</b>	<b>SAMPLES</b>
Side view of entire body <input type="checkbox"/>	Posterior view of lower jaw <input type="checkbox"/>	2 × premolar for x-ray analysis <input type="checkbox"/>
Side view of head and shoulders <input type="checkbox"/>	Posterior view of upper jaw <input type="checkbox"/>	DNA (4-mm tissue plug including hair) <input type="checkbox"/>
Front view of head and chest (for lion) <input type="checkbox"/>	Side view of lower jaw <input type="checkbox"/>	Saturated blood collection paper <input type="checkbox"/>
Front view of face <input type="checkbox"/>	Wide shot of all teeth <input type="checkbox"/>	
Close up of nose <input type="checkbox"/>		
Hindquarters showing scrotum (for leopard) <input type="checkbox"/>		

**Return form to:**

Name: \_\_\_\_\_ Fax Number: \_\_\_\_\_  
 Organisation: \_\_\_\_\_ Email: \_\_\_\_\_  
 Address: \_\_\_\_\_