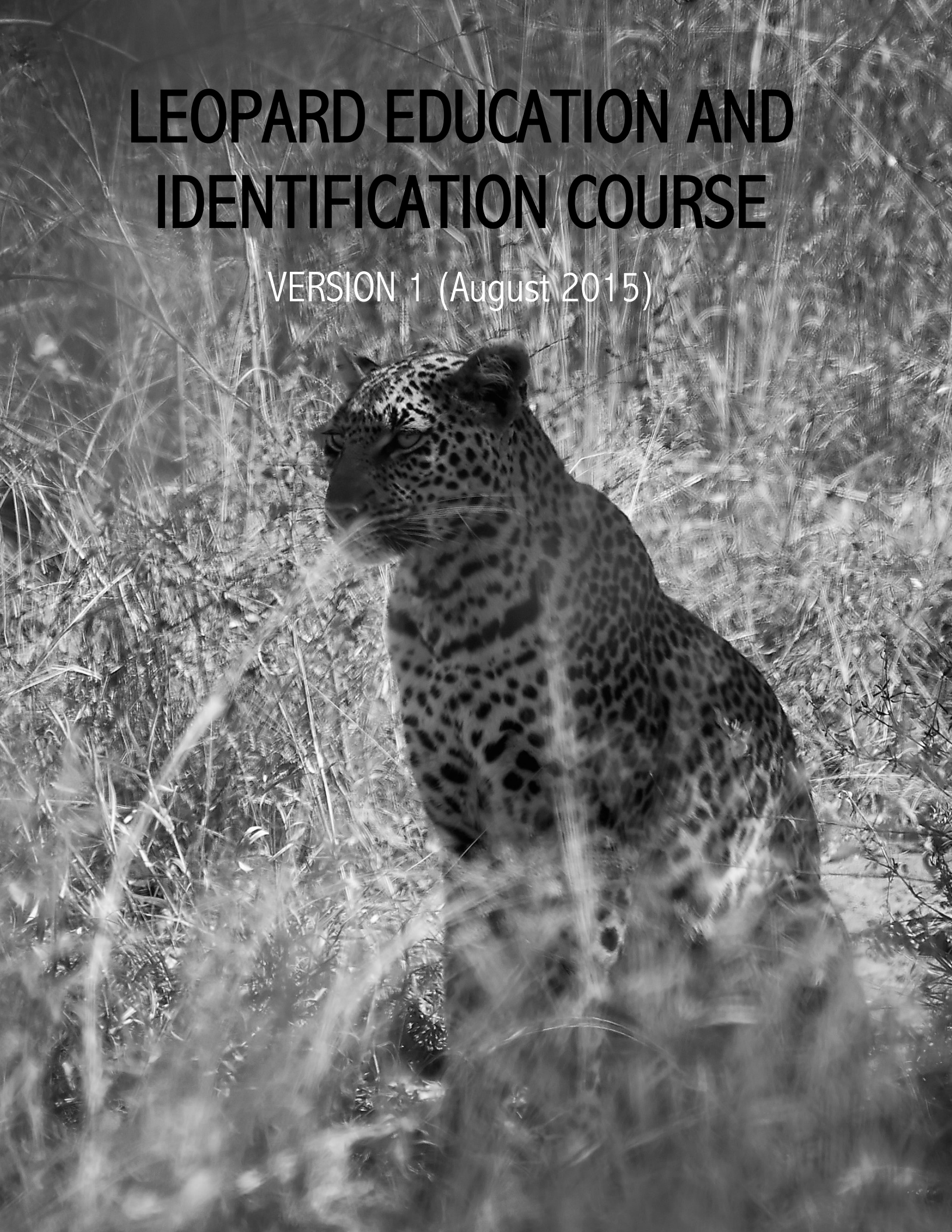
LEOPARD EDUCATION AND IDENTIFICATION COURSE

VERSION 1 (August 2015)



LEOPARD EDUCATION AND IDENTIFICATION COURSE

Completion of the course and exam is a requirement for anyone who hunts leopard in South Africa. The course is aimed at hunting outfitters, but guides and members of the public, who have an interest in leopard, are welcome to participate.

WELCOME

The Leopard Education and Identification Course is a platform to disseminate important information regarding leopard conservation, trophy hunting practices and changes related to provincial and national hunting regulations in South Africa. The course is relevant for anyone who hunts leopard or is interested in leopard biology, physiology, behaviour and ecology. Any hunting outfitter who wishes to hunt leopard in South Africa will have to successfully complete the exam in order to apply for a hunting permit for either a local or international leopard hunt.

The Leopard Education and Identification Course is a collaborative initiative between the Department of Environmental Affairs (DEA), the South African National Biodiversity Institute (SANBI), the Limpopo Department of Economic Development, Environment and Tourism (LEDET), Panthera, and the Primate and Predator Project. Collectively, all stakeholders are working together to investigate and address important components underpinning leopard management and conservation in South Africa.

THE COURSE

- Presents information about leopard biology, physiology and behaviour;
- Discusses the importance of identifying leopard gender for anyone who hunts leopard;
- Helps hunting outfitters make informed choices to improve the hunting experience and sustainability of hunting practices.
- The online exam requires a grade of 80% to pass.
- The online exam can be taken as many times as you wish.
- You will be emailed a competency certificate on successful completion of the exam. Please keep this certificate for your personal records.
- Only once you have successfully completed this course can you apply for a permit to hunt leopard in South Africa.
- Your competency certificate is valid for 12 months, after which you will have to retake the exam.

The Leopard Education and Identification Exam is available online by going to the Education section of the SA Leopard Hunting website.

LEOPARD IN SOUTH AFRICA

The leopard (*Panthera pardus*) is the most widely distributed of Africa's large cats (1, 2). The national population status of leopard across South Africa is largely unknown. However, estimates of leopard density across different geographical regions have progressed but these estimates are largely confined to protected areas. A wide range of factors influence leopard numbers including prey availability, habitat type and the extent of human pressures and consequently leopard numbers are highly variable throughout the country (3-5). High leopard densities of 30.3 leopard per 100 km^2 have been found in areas of high prey availability in the Sabie riverine area of the Kruger National Park (6), with 12.7 leopard per 100km^2 in the N'wanetsi concession of the park (7). Lower densities of 0.6 leopard per 100 km^2 have been reported in the Kalahari Gemsbok National Park, with 0.6-2 leopard per 100km^2 in the Cederberg Wilderness Area, where the abundance of prey species is limited (8, 9). Ongoing camera-trapping by Panthera's Limpopo Leopard Project estimate leopard densities of 2.9-11 leopard per 100km^2 at key surveillance sites across the Limpopo Province.

Despite the widespread distribution of leopard, the species has experienced a 37% reduction in their range throughout southern Africa over the past 100-150 years (10). This range reduction has been attributed to a number of factors, such as habitat degradation and fragmentation, depletion of natural prey species, poorly managed trophy

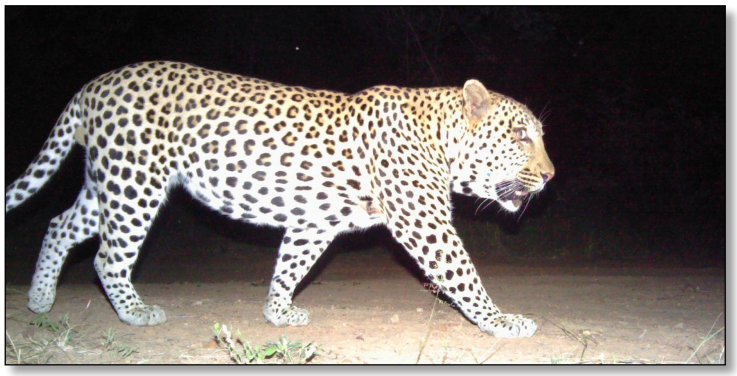
hunting harvests, persecution due to human-leopard conflict and illegal trade of leopard skins (5, 10-13). The reclassification of the leopard by the International Union for Conservation of Nature from “Least Concern” to “Near Threatened” reflects the changing population status of leopard worldwide (14).

The Limpopo Province hosts 63% of the land classified as suitable for leopard in South Africa, however, the viability of leopard populations is threatened by a variety of human factors. In Limpopo, leopard are killed legally and illegally for their role as predators and the threats they pose to livestock and managed game populations due to predation and (on very rare occasions) human life (15). Illegal hunting practices such as cage trapping, poisoning, shooting and snaring are responsible for a significant portion of mortality in the Limpopo Province and throughout South Africa (10, 15, 16). Poaching leopard for traditional medicine and the trafficking of their skins for cultural regalia also represents a significant threat to leopard populations (10, 15, 17).

PHYSICAL APPEARANCE

The body size and colouration of leopard varies geographically and reflects adaptations to particular habitats. Leopard have short legs relative to their long body. Leopard are medium-sized cats with short legs relative to their body, and the colour of their coats varies from pale yellow and deep gold to tawny and black (6). The body size and colouration of leopard varies geographically and reflects adaptations to particular habitats. The back, haunches, shoulders, upper forelegs and sides are marked with dark spots in a rosette pattern. The head, chest and throat are marked with smaller black spots. Large black spots cover the leopard’s belly. Each individual has a unique pelage, or spot-pattern, which can be used for identification. Leopard have a highly variable body size across their African range and are sexually dimorphic, as males tend to be larger than females. In the Western Cape of South Africa, male leopard have an average weight of 31kg, while females weigh an average of 21kg, which is about half the size of leopard found in northern regions of South Africa (2). In the Kruger National Park, South Africa, male leopard have an average weight of over 60kg and females of approximately 37kg (6). Leopard in South Africa and Namibia also show variation in length, with females typically between 185 and 198 cm long (n=20), while males are between 210 and 217 cm long (n=23) (6, 18, 19).

Figure 1. Leopard of the Limpopo Province are some of the largest in South Africa (below; estimated age = > 7 years), particularly when compared to leopard in the Cape (right; estimated age = > 7 years).



RANGE, HABITAT AND BEHAVIOUR

Leopard inhabit a wide range of habitats from mountainous regions, woodland savannah and forests ecosystems, deserts, and near urban areas (1, 20). Leopard can tolerate human activity and they live in human-dominated landscapes, but due to their elusive and nocturnal behaviour they are often able to persist without detection and in areas devoid of other large predators (21).

Leopard are opportunistic hunters and have one of the broadest diets compared to other large predators with 92 different prey species recorded in Sub-Saharan Africa (22). Leopard prefer to prey upon species within the range of 10-40kg and a mean body mass between 23-25kg which are found in small herds, dense habitat and afford the lowest risk of injury (22). Leopard hunt via stalking or ambushing their prey and prefer hunting under intermediate or dense cover (22). Prey species such as impala, bushbuck and common duiker fall into the preferred categories as well as livestock and economically expensive game species (22). However, leopard have also been known to hunt smaller species such as the hyrax in mountainous regions but larger species such as plains zebra and blue wildebeest are often avoided (22).

MATING, BREEDING AND RAISING YOUNG LEOPARD

Female leopard are important for maintaining and stabilising leopard populations through giving birth, rearing and protecting future generations of cubs. Females come into heat several times a year (23-25). When females come into heat they display excessive head rubbing and rolling behaviour, secrete pheromones into their urine and vocalise for several days prior to association with a male (23). Females initiate mating by walking back and forth in front of a male and brushing up against him or swatting him with her tail (23). Females usually begin to mate from 3 years of age and give birth following a gestation period of 95.5 days (6, 23). In contrast, males start to mate from 3 years of age and enter breeding activity from 4-6 years of age (26). Leopard in the Sabi Sabi Game Reserve, South Africa, usually give birth more frequently in the wet season than in the dry season with a peak number of births in December and litter size can vary from 1-3 cubs per female (27). Females will mate again when cubs are around 10 months of age (23). Cubs attain independence from 11-19 months of age (6, 23, 27, 28).

MORTALITY IN CUBS

Cub survival in South Africa ranges from 37%-58% across a range of studies (6, 23, 27, 29). Leopard cubs are most vulnerable during the first four months of life. This includes the time in which cubs are confined to dens (usually for six to eight weeks after birth) (27). Dens serve as centres of activity where females move back and forth between hunting and nursing (27). Therefore, seeing a leopard without young does not mean she is without dependant cubs. Male leopard kill offspring sired by other males in order to encourage female leopard to come into heat. Infanticide in the Sabi Sabi Game Reserve, South Africa accounted for 40% of known cub mortalities (27). Cub survival decreases once females reach 9 years old and drops notably for females older than 14 years (27). However, female leopard do not reach reproductive senescence and can therefore continue to contribute to the population.

TROPHY HUNTING IN SOUTH AFRICA

Leopard are legally hunted in South Africa by both residents and foreigners for sport, recreation, and damage control. Leopard are listed on Appendix I by CITES (Convention for International Trade of Endangered Species). Appendix I includes all species threatened with extinction, are affected by trade or the trade of body parts, and are subject to regulation via export and import permits.

Unregulated legal harvesting of leopard populations has the potential to negatively deplete leopard numbers, both through direct removal of individuals and the resulting impacts on population structure (30). For example, high levels of mortality among females influence reproductive success, and therefore, population recovery (13). Leopard maintain complex social relationships with one another such that high mortality rates within a population could increase the likelihood of contact between unfamiliar individuals and promote intraspecific strife (competition and fighting within populations to maintain territories and access to females). Invasive management activities that artificially elevate male turnover may increase infanticide and decrease cub survivorship to unsustainable levels (13, 31, 32). Excessive trophy hunting of male leopards under 7 years old reduces the viability of a population because females failed to raise sufficient cubs owing to a constant cycle of infanticide (33). However, removal of male leopard of 7 years or older is shown to have fewer negative effects on leopard populations. This is because, by this time, a male of 7 years and older has held a territory for 3-4 years and sired at least one cub to independence. The removal of leopard from a population may also create vacant territories, attracting leopard to colonise new areas (13). In the Phinda Nature Reserve, South Africa a ‘vacuum effect’ was observed where high rates of mortality outside the reserve, caused the dispersal of sub adult leopards from the reserve to non-protected areas (13). The

immigration of sub-adults into a population may mask the effects of population decline caused by high mortality rates causing a temporary increase in population density (34, 35).

Hunting in South Africa is regulated by setting annual trophy hunting permits of 150 per year; these are allocated to provincial wildlife authorities to distribute permits to hunting outfitters or landowners within their province. The hunting quotas for South Africa have been criticised by researchers due to a lack of scientific input on the quota setting as well as a lack of knowledge of leopard population trends within hunting areas (13). However, trophy hunting systems have been revolutionised in KwaZulu-Natal by capping the number of hunting permits issued per year, linking the likelihood of obtaining a hunt with the size of the property and restricting hunting to adult males (30). These measures alongside other management strategies designed to improve the issuing of damage-causing animal permits has improved the viability of leopard populations by decreasing annual leopard mortality, human-leopard conflict, intraspecific conflict and increasing leopard reproductive success (29).

TROPHY HUNTING IN SOUTH AFRICA IN 2016

Additional information will be added once policies are finalised.

HUNTERS PLAY A CRITICAL ROLE IN LEOPARD MANAGEMENT

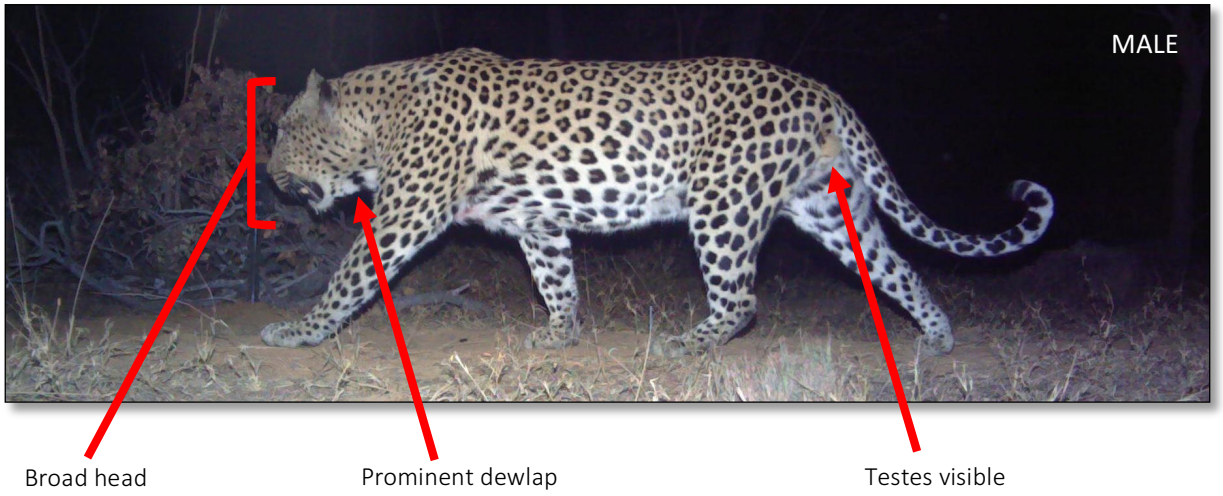
SANBI are asking hunters, guides and outfitters to do several things to help ensure that leopard hunting is an activity that people can continue to enjoy.

The management goal is to sustainably manage viable leopard populations across South Africa, therefore, hunters are prohibited from taking female leopard (the removal of females has been shown to have a disproportionate negative impact on leopard populations). We are asking hunters to take plenty of time to determine the gender of the leopard and make an informed choice before hunting in order to:

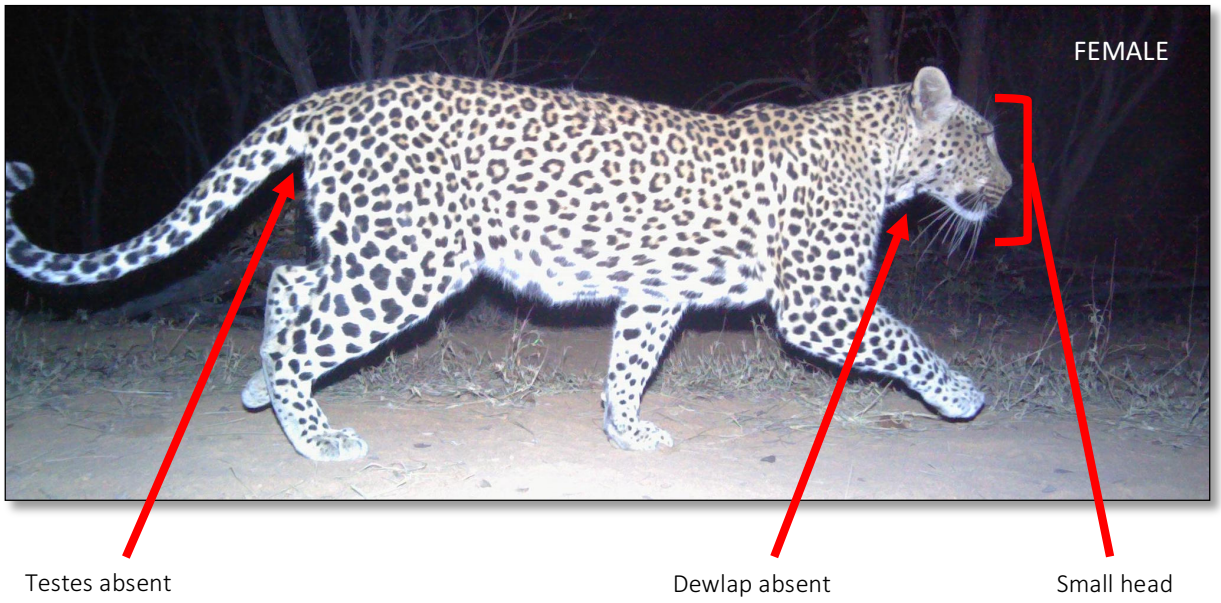
- Reduce unwanted female leopard mortality;
- Reduce leopard cub mortality associated with orphaning and infanticide;
- Increase hunter satisfaction, and;
- Help South Africa meet its conservation objectives;
- Make South Africa a world-class and sustainable hunting destination.

LEOPARD GENDER IDENTIFICATION (SEXING) IN THE FIELD

Males: Male leopard can often be identified by the presence of the testes, although they may be less visible in males < 2 years of age. There is often confusion between identifying females from < 2 year old males because they superficially resemble females which are of a similar size at this age (36). However, mature males weigh at least 60% more than their female counterparts and have longer and broader skulls (36). Three key characteristics should all be used to identify a male leopard; (1) a large, broad head, (2) a prominent dewlap, and (3) the presence of testes.



Females: Characterised by a small head and slender neck. Testes are clearly absent. The anus is directly below the base of the tail and the vulva is directly behind the anus but is usually hidden by the base of the tail. The teats of females are usually inconspicuous, even those of mothers with weaned cubs or mothers that have just finished nursing cubs. Three key characteristics should all be used to identify a female leopard; (1) a small head, (2) a slender neck, and (3) the absence of testes.



Sexing a leopard can, sometimes, be determined by using binoculars, however, camera traps have made sexing leopard easier and less likely to lead to an incorrect determination. Outfitters frequently use camera-traps to monitor local leopard populations, particularly at bait sites. Images captured at these sites can greatly aid sex determination. It is important to place camera-traps in strategic locations to increase the likelihood of capturing clear images of a leopard's hindquarters and flanks. Images of the hindquarters are necessary to determine the presence or absence of testes. Flank images are necessary to identify unique individuals using rosette and spot patterns.

Figure 2. Leopard exhibit marked sexual dimorphism (i.e., males and females look very different). Males are vastly larger than females, with a broader head, muscular chest, and prominent dewlap.

One of the easiest ways to identify and sex a leopard is to photograph the leopard whilst it's approaching the bait site. That is, whilst the leopard is still walking on the ground. Hunting outfitters should place their camera-traps in locations where these images are most likely. Camera placement is very important. It will also help to place bait sites and cameras in natural funnels, or choke-points, like drainage lines or where dense vegetation naturally guides the leopard along a particular path.

COMPARISONS OF LEOPARD TRACKS

A leopard's front tracks are bigger and rounder than its hind tracks and the back pad of a paw has three lobes present (Fig. 3). Leopard front paws are 70-90mm in length and 70-90mm in width, whilst the back paw is 80-100mm in length and 60-80mm in width. The footprints of males are larger and broader than those of a female. The toes of the female are more slender than those of the male. A young male whose tracks are the same size of the female can be distinguished by the shape of his footprints. On soft substrate such as sand or mud, tracks can sometimes appear larger, as the animal spreads the toes.

Figure 3: Prints of a leopard—front tracks are bigger (far left) and rounder than the hind tracks (left).

STRIDE LENGTH

The stride of a leopard can vary depending on the gait from walking, stalking and trotting and are summarised in Fig. 4.

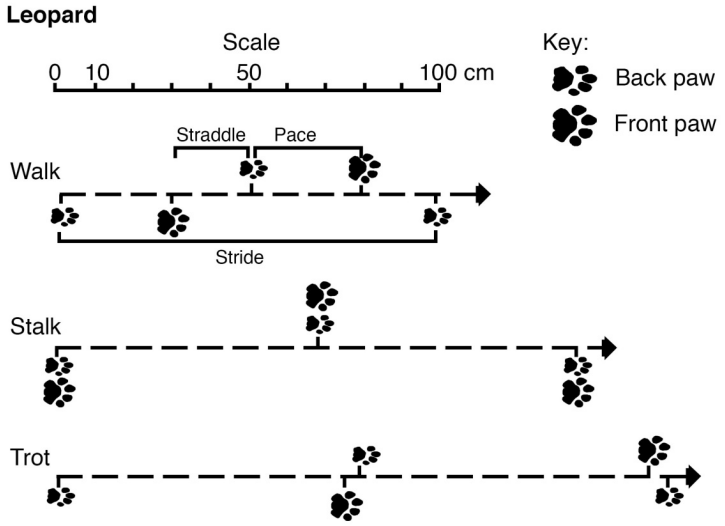


Figure 4: An illustration of the stride length, straddle and pace of a leopard walking, stalking and trotting adapted from Stander et al (1997). The stride is defined as the distance between two prints made by the same foot; a straddle is the distance between the left and right tracks either front or back; and a pace is the distance between

the front and back track either left or right. In the figure where the front and back paw appear together, the back foot is placed in the same location as the front print as the leopard moves forward.

SUMMARY - SEXING LEOPARD

- Male leopard have distinct and identifiable external genitalia.
- Adult male leopard are much larger than their female counterpart.
- Use all three identifying characteristics to sex a leopard: (1) size of head, (2) prominent dewlap, and (3) presence of testes.
- Use binoculars or camera traps when sexing a leopard.

AGING MALE LEOPARD

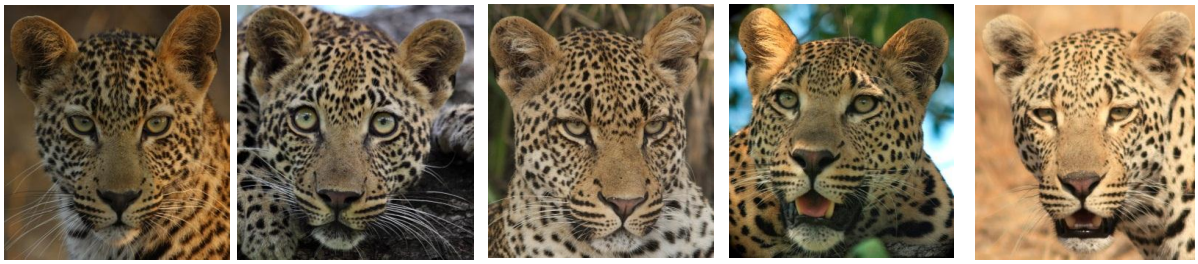
Some key characteristics are used to help age a male leopard. These include the extent of facial scarring, ear condition, and dewlap size (i.e., a flap of skin which extends from the underside of the maxilla to the upper chest) (36). Aging a leopard can be tricky in the field, and often facial scarring and ear condition are difficult to discern in low light. Given these limitations, we recommend that hunters use dewlap size as their primary aging indicator—if a prominent dewlap is present (see images of ≥ 7 year males, below) then the male leopard is a viable trophy. The following explanations and images provide a general guide to age male leopard:

Male (< 2 years): Teeth are slender (not yet fully erupted or developed), sharp, and white (37). No facial scarring evident, the fur above the muzzle appears smooth and glossy. The ears show no wear. No dewlap is visible from side profile (36).

Teeth

10 mths | 1 yr 2 mths | 1 yr 4 mths | 1 yr 8 mths

Portrait



10 mths | 1 yr 1 mth | 1 yr 5 mths | 1 yr 7 mths | 1 yr 11 mths

Side profile

10 mths

1 yr 1 mth

1 yr 6 mths

1 yr 7 mths

1 yr 10 mths

Male (2-4 years): Teeth are fully erupted and developed and appear mostly white with signs of slight discolouration (37). Teeth show slight wear (particularly on tips of incisors) and irregular chipping and wear on canine ridges (definition of canine ridge: enamel longitudinal ridge along the distal side of canines) (37). Very little facial scarring evident. The ears show limited wear. No dewlap is visible from side profile (36).

Teeth

2 yr 1 mths

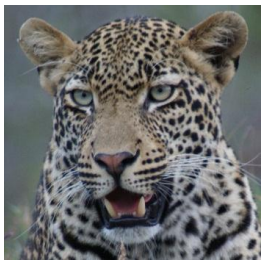
2 yr 6 mths

3 yr 3 mths

3 yr 6 mths

Portrait

2 yr 2 mths

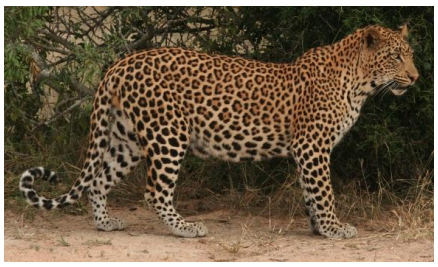


2 yr 6 mths

3 yr 2 mths

3 yr 10 mths

Side profile



2 yr 5 mths

2 yr 10 mths

3 yr 0 mths

3 yr 5 mths

Male (4-6 years): Wear present on all teeth with ridges worn along the length of the canine (37). Signs of tooth discolouration appear moderate to advanced. Males at this stage may have broken canine tips (NB: broken teeth are not a reliable indicator of age) (37). Moderate facial scarring evident. Ears show moderate wear. Dewlap becoming visible from side profile, but not yet prominent (36).

Teeth

4 yr 0 mths

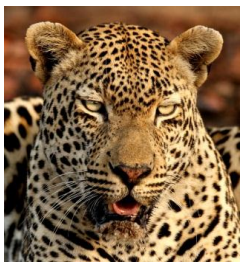
4 yr 6 mths

5 yr 0 mths

5 yr 10 mths

Portrait

4 yr 2 mths



5 yr 3 mths

6 yr 0 mths

6 yr 6 mths

Side profile

4 yr 5 mths

5 yr 0 mths

6 yr 1 mths

6 yr 7 mths

Male (≥ 7 years): Tooth discolouration is well advanced, with signs of flaking of the enamel layers (37). Excessive wear on all teeth (37). Occasional broken canine (NB: broken teeth are not a reliable indicator of age). Heavily scarred face, fur has thinned and appears pockmarked. The ears are heavily worn and the ear lobe extensively notched. The nose is often black. Adult males have a well-developed chest, muscular neck and prominent dewlap (36).

Teeth

8 yr 5 mths

9 yr 8 mths

10 yr 9 mths

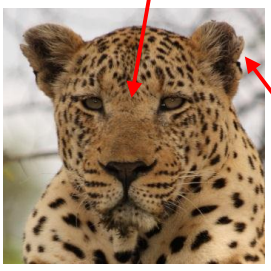
11 yr 4 mths

Portrait

7 yr 8 mths

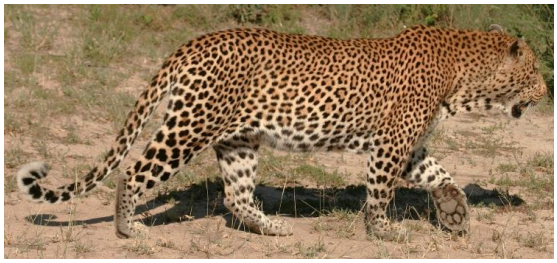
9 yr 9 mths

10 yr 6 mths

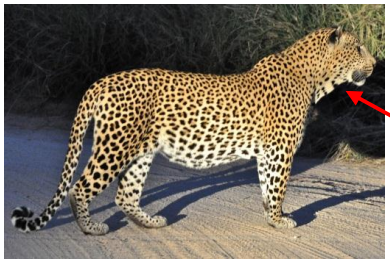


13 yr 1 mths

Side profile



7 yr 6 mths



8 yr 10 mths

11 yr 11 mths

14 yr 4 mths

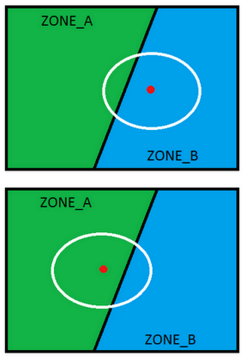
SUMMARY – AGING MALE LEOPARD

- Although tooth discolouration offers a useful aging indicator, it can only be used after the leopard is killed.
- Use a number of characteristics to age a leopard, not just one.
- The leopard must show the following characteristics: (1) testes present, (2) prominent dewlap, (3) broad head and large chest, and (4) some form of extensive facial scarring and/or poor ear condition.

HUNTING ZONES ACROSS SOUTH AFRICA

Historically, the hunting of leopard in South Africa has been clustered within certain areas causing high, localised offtake. These areas effectively act as population 'sinks' (i.e., where high hunting attracts leopard from surrounding areas, thus drawing them in causing artificially inflated leopard densities; also known as the 'vacuum effect'). To prevent this, South Africa has adopted a zonation approach to leopard management using geographical catchment areas. These 'hunting zones' are dynamic, and change each year based on estimated leopard population trends derived from population models and leopard habitat suitability. When applying to hunt in a hunting zone, an applicant can submit only ONE application. An application must fall within ONE hunting zone such that all GPS co-ordinates (provided in decimal degrees) of the properties must fall within the same hunting zone. Hunting permits cannot be transferred to other hunting zones. Special care must be taken when deciding which properties to include in the application. If the group of properties falls into more than one hunting zone, the application will be disqualified. Below is a simple explanation of how the system works:

- GPS co-ordinates (red dot) from the centre of the property (white circle) must be provided.
- If the property is near to an adjacent hunting zone, special care must be taken to understand which zone it is in.
- On the top figure, the property is in ZONE_B since the GPS co-ordinates fall within the blue area.
- On the bottom figure, the property is in ZONE_A since the GPS co-ordinates fall within the green area.



- If an applicant has been successful in obtaining a hunting permit then they eligible to hunt on the ENTIRE property/properties that they initially applied for. For example, in the top figure, a hunting outfitter can hunt on the property in ZONE_B and also the small section of the property that extends into the green area. The entire property is available to hunt.

Please refer to the SA Leopard Hunting website for additional information, and to apply for a permit.

HUNTING RETURN FORMS FOR 2016

Hunting outfitters are required to complete an online 'hunt return form' which includes information such as the GPS co-ordinates of the hunt, 10 photographs of the trophy must be uploaded, measurements and hunting methods used which are submitted online within 15 days of the hunt, regardless of hunting success. No emailed or hardcopy hunt return forms will be accepted, export permits will not be provided if outfitters fail to complete and submit hunt return forms online and future hunting quotas will be affected if outfitters fail to complete and submit their forms online. The hunt return form reference guide can be downloaded from the website and used during a hunt to collect data for later submission online.

THANK YOU

This completes the instructional portion of the Leopard Education and Identification Course. Thank you for taking the time to study this material. Please also refer to the pocket guides made available on the website. Once you have studied all the material, you may take the exam.

Good luck!

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