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# Focus on the Lion (*Panthera leo*)

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## Lion

### *Panthera leo* (Linnaeus, 1758)

Afrikaans	Leeu
German	Löwe
French	Lion d'Afrique
Swahili	Simba
isiNdebele	Indua
isiZulu	Ingonyama
isiXhosa	Ingonyama
seSotho	Tau
seTswana	Tau
Shona	Shumba
Shangaan	Nghala
Venda	Ndau
Nama/Damara	Xamm
Herero	Shitona
Ovambo	Shinga

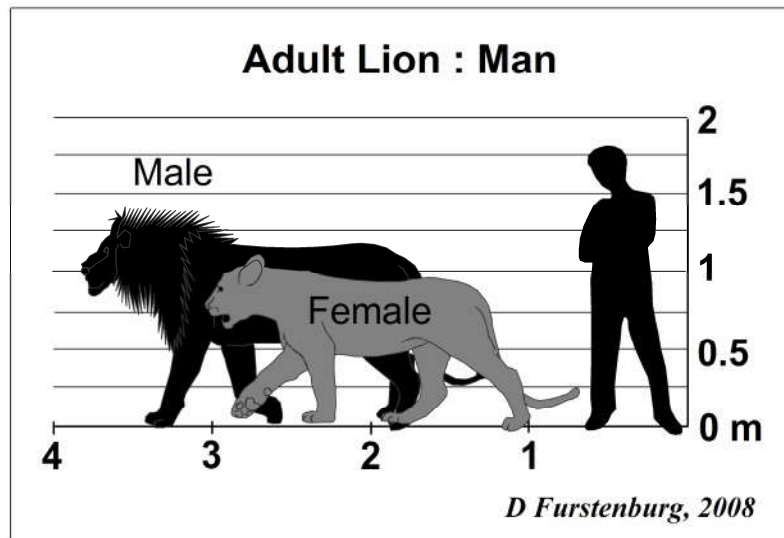


Photo: Johan vd Vyver

#### **IUCN Conservation Status:**

Vulnerable (VU, A2abcd); a population reduction of 50% or more over the last 10 years.

**King of the Beasts!** Captured in the legends of ancient Rome, Greece and Egypt and threading through the traditions of African culture, the powerful spell of the lion has created a symbol of royal leadership. It gave form to the Sphinx and was engraved on Egyptian tombs. The eye was especially significant and the mane gave rise to religious myths and beliefs in traditional African societies. Lion is one of the African big five and certainly serves as the greatest attraction for tourists and hunters.

<b>Taxonomy</b>	Kingdom:	ANIMALIA
	Phylum:	CORDATA
	Class:	MAMMALIA
	Supercohort:	LAURASIATHERIA
	Cohort:	FERUNGULATA
	Superorder:	FERAE
	Order:	CARNIVORA
	Suborder:	FELIFORMIA
	Family:	Felidae
	Subfamily:	Pantherinae
	Genus:	<i>Panthera</i>
	Species:	<i>leo</i>

The lion's name is derived from the Greek word "leon". It was first described as *Felis leo* by Linnaeus in 1758 from a specimen found in Constantine, Algeria. In 1917, R.I. Pocock altered the genus name to *Panthera leo* after the cat family was split into two sub-families namely pantherinae the roaring cats and felinae, the non-roaring, purring cats. The genus Panthera has four species

- *Panthera leo* the lion
- *Panthera pardus* the leopard with three sub-species
- *Panthera onca* the jaguar from South and Central America
- *Panthera tigris* the tiger of tropical Asia with five sub-species

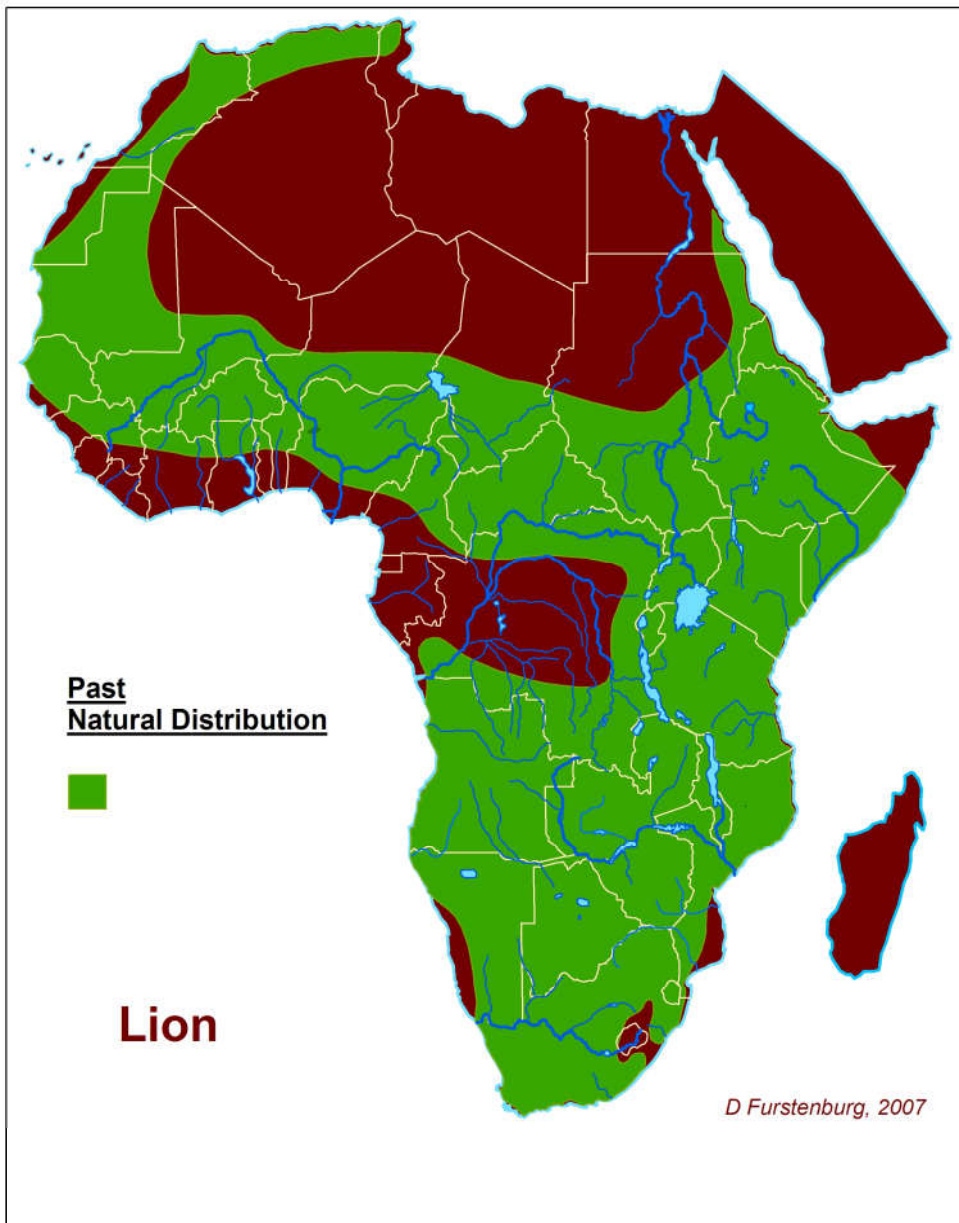
Members of the genus *Panthera* are distinguished by an elastic ligament in the hyoid apparatus that allows free movement of the larynx and enables roaring vocals. The genus name *Panthera* was only officially accepted by the International Commission on Zoological Nomenclature in 1985.

The earliest fossils of lions date back approximately 3.5 million years BP and were found at Leatoli in Tanzania. In South Africa, fossils dating 2.8-2.4 million years BP were found at the Sterkfontein caves in Gauteng. Despite the genetic hybridization that gives rise to varieties such as the white lion of the Timbavati, only two living extant lion subspecies are recognized

- *Panthera leo leo* the African lion

- *P.l. persica*. the Asiatic lion

## Distribution



In the past, lions were widely distributed throughout Europe, most of Asia and the whole of Africa. They became extinct in Europe when the last individual was killed in Greece circa 100 AC but persisted in Palestine until the 1100s. In 1990 an Asian census showed that <300 individuals remained. Lions became extinct in various regions of North Africa between 1890 and 1940. They are still widespread at present but are scarce in most of sub-Saharan Africa. Numbers in the continent declined from approximately 200 000 in 1880 to 20 000 in 2001. Lions were once common on the Cape flats but disappeared from the Western, Northern and Eastern Cape Provinces and from the greater part of KwaZulu-Natal during the 1860s. Vagrants still occasionally wander into areas far from their established

distribution ranges. In 1988 there were 164 lion in the Hluhluwe-Imfolozi Corridor in KwaZulu-Natal but by 1992 the number had declined to 65, probably as a result of inbreeding.

## Description

Other than the Asian tiger, lions are the largest living cats and are the largest living African predator. Both the body size and appearance differ between environments as they are a result of a combination of the type of prey consumed and the inherent genetic variation of the population. The lack of genetic variation between lion populations is important, as the species is being forced into bottlenecks. Adult males from southern Africa have a mean body mass of 190-200 kg and females, 125-140 kg. The maximum recorded weight of males in the Kruger National Park was 225 kg and females, 152 kg. This is greater than the maximum weight of lion in East Africa where males were 180 kg and females, 120 kg. A record male of 272 kg was shot near Mt Kenya. In the Etosha National Park of Namibia males reach a mass of 260 kg and females, 165 kg

Lion have the typical body profile of a cat with a powerful muscular body, short robust legs, enlarged paws and shoulders that project slightly above the line of the spine when walking. The tail is extremely long and serves as a means of balance when charging. It is more than half the length of the body including the head, and is ended by a black tuft of hair.

The body is a uni-coloured dull, sandy-yellow or tawny-yellow on the upper parts and flanks, and a light yellow-white on the under parts and inner legs. The back and face of some individuals may turn golden-brown. Stripes and spots are generally absent although a few adult animals may retain the rosettes and spots of their infant stage. Cubs are born with characteristic brown rosettes and spots on the face, legs and the sides of the body that generally fade with the approach of maturity. The spots have their origin in the progenitor of the lion, a spotted cat that inhabited Africa in an earlier age when the continent was almost entirely covered by forest.

Adult males reach a mean shoulder height of 125 cm and adult females a mean of 100 cm. The total body length from the nostril to the tail end can reach up to 200 cm in males and 180 cm in females.

Adult males have a mane of dense, dark, tawny hair of up to 16 cm around the neck that extends down the throat between the front legs and onto the breast in zoo populations and desert lions. In bushveld and wooded habitats manes are generally confined to the neck and throat area. The extinct Cape lion, a former sub-species, was known for an extremely well developed mane that extended almost to the navel. This form of mane was shared in common with the legendary lions depicted in Greek and Roman lion cages. Most of these lions were descended from the extinct Atlas lion of the Moroccan region of North Africa that had a massive, bushy mane. Kalahari lions tend to have a more developed mane than lions from the sub-tropical Lowveld bushveld. In contrast, the lions of Somalia, Ethiopia and

north-eastern Africa do not have a mane.

The white lions found in the Timbavati region of South Africa are not an albinistic form but a genetic colour hybrid similar to that of the king cheetah *Acinonyx jubatus*, the black leopard *Panthera pardus*, the black impala *Aepyceros melampus*, the white springbuck *Antidorcas marsupialis* and the white blesbuck *Damaliscus pygargus*. A lack of colour pigmentation in albinos results in their having a pink eye retina and white hair. In contrast white lions retain the golden-yellow eye of the common lion indicating a colour hybrid rather than an albinistic form.

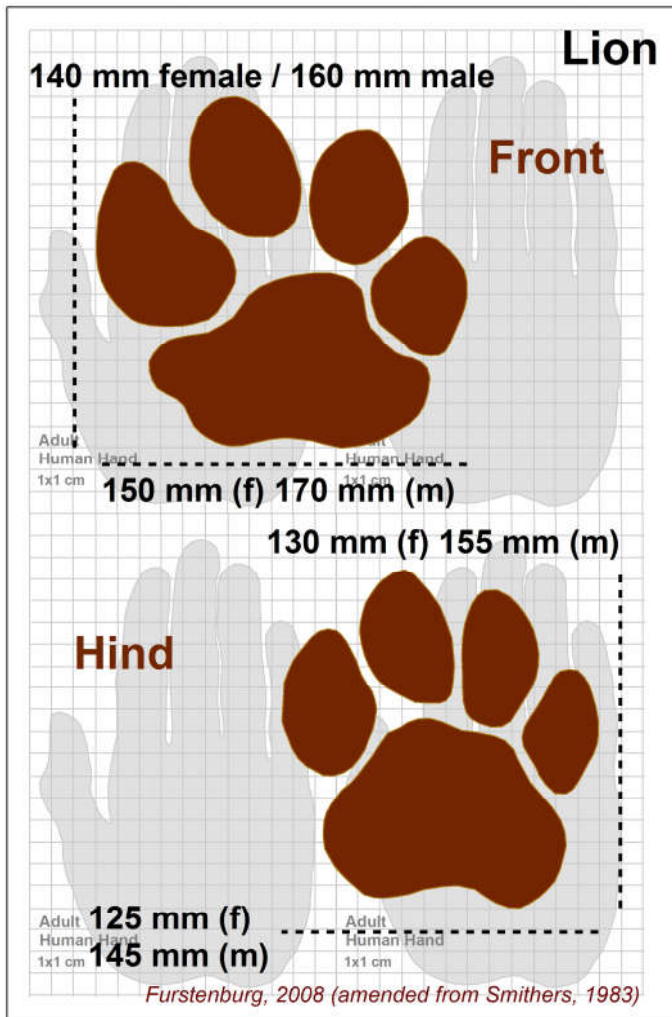
Individual lions can be identified by the pattern and sequence of their whiskers each animal having a unique whisker pattern similar to the fingerprint of a human.



### Spoor

Only four of the five cushions of the front spoor are printed as the fifth is placed well above the others on the back of the leg. The front spoor of an adult lioness measures 140x150 mm and the male, 160x170 mm. The hind paws have four digits with four cushion prints and are 130x125 mm in a female and 155x145 mm in a male. The prints do not show claw markings as the strong, bent claws 25-30 mm long retract into the nail bed during normal movement.





## Information table

Lion information table			
Characteristic		Male	Female
Adult body weight	kg	200	140
Adult shoulder height	cm	125	100
Sexual maturity age	months	20 – 24	20 – 24
Social maturity age (1st mating)	years	4,5 – 5	2,5 – 4
1st Litter born at age	years		3,5
Gestation period	days		110
Litter size	number		1 – 6
Litter interval	months		10 – 18
Rutting season		Year round	
Birth season		Year round	
Weaning age	months	6 – 12	
Independent at age	months	12 – 18	
Gender ratio: entire population (natural)		1	1,5
Mating ratio: adults (natural)		1	3

Cubs birth ratio		1,2	1
Maximum lifespan	years	16	14
Social order		Gregarious groups (prides)	
Home range (Bushveld) (Arid environment)	km <sup>2</sup> km <sup>2</sup>	30 – 600 to 3 900	30 – 600 to 3 900
Territory range	ha	None	None
Daily food consumption (adults)	kg	7 – 14	4,5 – 8,5
Maximum stocking load		Determined by prey abundance	
Minimum habitat size required	ha	500	
Annual population growth		8 – 18%	

## Trophy

Trophies are measured by adding the maximum length of the skull from the nostril to the base of the cranium, to its maximum diameter.

Lion trophy records					
Rowland Ward (XXVII edition 2006)					
Minimum qualifying value = 24" (60.96 cm)				Measuring method 17	
Rank	Inch	cm	Locality	Year	Source
1 <sup>st</sup>	28 <sup>3</sup> / <sub>4</sub> "	73.03	Mpumalanga, RSA	1968	I. Mackenzie
2 <sup>nd</sup>	28 <sup>1</sup> / <sub>2</sub> "	72.39	Namibia	1985	A. Agnese
3 <sup>rd</sup>	27 <sup>1</sup> / <sub>2</sub> "	69.85	Luangwa Valley, Zambia	1968	J.L.O. de Suelves
4 <sup>th</sup>	27 <sup>5</sup> / <sub>16</sub> "	69.37	Lobaye, Central African Republic	?	River & Forest Dept. CAR
5 <sup>th</sup>	27 <sup>1</sup> / <sub>8</sub> "	68.9	Johannesburg, Gauteng, RSA	2001	Johannesburg Zoo
Safari Club International S.C.I.					
Minimum qualifying value = 23" (58.42)				Measuring method 18	
1 <sup>st</sup>	27 <sup>3</sup> / <sub>8</sub> "	69.53		1995	S.E. Chancellor
Confederation of Hunters Associations of South Africa CHASA					
Minimum qualifying value = 23" (58.42 cm)				Measuring method (F)	
1 <sup>st</sup>	26 <sup>1</sup> / <sub>2</sub> "	67.31	Mpumalanga, RSA	1996	L. Combrink

## Habitat requirement

Lions inhabit almost any type of habitat other than forest, ranging from desert and arid Karoo to grassland, savannah, bushveld, valley thicket and mountain kloof thicket. The topography ranges from beaches, flats and riverine areas to rocky hills, mountains and highlands. The suitability of a habitat is measured by the right terrain for successful stalking and killing rather than by topographic parameters. Lions occur at an annual mean rainfall of <100 to >1 200 mm. Refuge such as tall grass, bush, tree shade and rocks are necessary for the stalking of prey as well as for providing a resting place during the heat of the day. Very dense bush thicket is regarded as marginal habitat for lion as it is less suitable for successful kills. Available surface drinking water is an essential requirement.



## Behaviour

Lions are predominantly nocturnal but activity may extend to all daylight hours depending on the abundance of prey. However, hunting success is greater during the dawn, dusk and evening hours. Studies showed that 88% of kills occurred during the night in the Serengeti and 98% in the Etosha National Park. Most daylight hours are spent resting in the shade of vegetation on hot days or on sandbanks and large rocky outcrops on cooler days. It is the only species of the cat family that is socially bonded and hunts in social prides.

Lions move quickly and can cover distances of up to 50 km from the den in order to reach large prey resources such as migrating wildebeest *Connochaetus taurinus* in the Serengeti and the Kruger National Park. General movement ranges from 11-33 km per night. Tree climbing is not unusual and lions climb high into the canopy of larger trees with ease. They frequently climb trees in order to rest on the branches or to reach a leopard kill stored high in a tree.

Lions are extremely temperamental and can change from being very shy one day, to being easily aggravated and aggressive the next. Once a lion has bitten a human it loses its fear of man and will continue attacking. Such an individual often becomes an addictive man-killer. They tend to be wary of artificial noise generated by man but over a period of time become accustomed to it and lose their fear. The size of strange objects, particularly of man, contributes to the degree of fear experienced by a lion. If a human bends, sits or turns its back on the cat it signals submissive behaviour that often elicits an attack. Facing a lion and enlarging the size of the profile by stretching the arms open when wearing a large coat or jacket or by waving large objects in the hands, creates a measure of fear in the lion that can defuse the situation.

Lions are strategic hunters that plan in advance. Their strategies vary depending on the size of the pride and its social order. The basic strategy is to appoint specific individuals of the pride to alert the prey, while others stalk the flight paths of the alerted animals in order to ambush them. During the stalk a lion uses every object or piece of vegetation as cover in order to get as close to the prey as possible before alarming it. Most chases are short, covering a distance of 100-200 m in 6-15 seconds and reach a speed of 16.7 m per second or 60 km/hr. In the Serengeti, hunting is the prerogative of the lionesses and the sub-adult males; alpha males do not join in the chase.

Smaller prey is usually grabbed by the neck or the back of the head in order to either break the spinal cord, or to rip out the trachea and smother the prey. Once a prey is captured, the rest of the pride closes in to assist the successful pride member. If the prey is still alive, the second lion to arrive on the scene usually grabs its nostrils to stop it breathing. In the Kalahari, lions usually kill gemsbuck by jumping onto their backs and breaking the spine with momentum and mass, as the horns are too dangerous to allow an attack on the neck or head. With large prey such as buffalo, the first lion jumps onto the hind quarters to unbalance it, while a second and third lion will grab the neck and snout to smother it. In a giraffe kill, one or two lions jump onto the hindquarters and bite into the flesh, hanging onto

the prey until it collapses from blood loss. The hunting success of prides varies from 15-95% and for solitary individuals from 2.5-29%.

There is a strict hierarchy in the order of feeding at a carcass. Alpha males feed first and aggressively attack any female or youngster attempting to intrude. Second in line are alpha and beta females and their cubs and only then are the sub-adults allowed to feed. The strictness of this order depends on the size of the carcass.

Lions are water dependent and need a daily intake, especially after hunting and feeding. They drink mostly in the early morning after which they rest under shaded vegetation for the day and only emerge late in afternoon to begin the night's activities. In lion country, it is wise to be cautious when approaching large shady trees near water points during midday hours as there is a good chance of disturbing a resting lion.

### **Feeding & Nutrition**

Lions are opportunistic and regard any live or strange object as a potential food source, biting it to test its edibility whatever its smell. Their feeding preference is determined by the availability of prey and they can adapt to almost any food source. In desert habitats the bulk of a lion's diet consists of hyrax, mice, porcupine, ground birds and insects, while in the Kruger National Park it consists primarily of impala, blue wildebeest, zebra and warthog complemented by giraffe and buffalo. On the Skeleton Coast of Namibia, nomadic, solitary lions are in direct competition with brown hyenas and black-backed jackals as they feed mainly on seal and marine bird carcasses found in the tidal zone. Lions prey on animals with in body mass ranging from 200 g, such as mice, to the 1 300 kg of a giraffe bull. The preferred prey size is a live mass of 60-350 kg. Larger prey is normally hunted by a pride or associated group of lion, as hunting larger holds the risk of injury for an individual. In general 3-5 prey species constitute 80-90% of the diet.

An adult lion male consumes 6.5-7.5 kg meat per day and an adult lioness 3.8-5 kg. In nature, lions feed once every four days on average and as much as 45 kg of flesh may be consumed. After taking down a large prey, the pride may spend several days in the vicinity, returning to feed several times until the carcass is consumed.

It is important for an owner to note the following feeding regimes before considering the introduction of lion into a game ranch

- one adult free roaming lion male requires an equivalent of 113 live impala, or 146 live springbuck, or 26 live blue wildebeest per annum
- one adult free roaming lioness requires an equivalent of 82 live impala, or 104 live springbuck, or 18 live blue wildebeest per annum

A pride of lion requires less prey per lion per annum compared to solitary individuals. Studies in the Kruger National Park indicated a mean of 15 prey animals of mixed sizes, from warthog to giraffe, per lion per annum. In the Kalahari desert an annual kill of mixed

sizes ranging from mice to gemsbuck, is 47 prey animals per lion.

### **Territory & Home range**

The most important parameters limiting home range size are prey abundance and migratory movement. In general, each pride occupies a home range that has a degree of overlap with the ranges of adjacent prides. Home ranges are aggressively defended against intruders from other prides or nomads. The majority of the home range also serves as the territory of the pride. Spatial separation exists between prides when they enter the overlapping zone between home ranges, as they do not tolerate each other's presence and avoid entering the overlap at the same time. This avoidance action is maintained by a vocal communication that can be heard up to 3 km away in wooded vegetation and up to 5-7 km across open flats.

Measured home ranges vary from 2 000-25 000 ha in wooded bushveld, to 4 500 ha in the Ngorongo Crator, 3 000-40 000 ha in the Serengeti, 15 000-107 500 ha in the Etosha National Park and 70 000-390 000 ha in the Kalahari. The size of a home range is not static but varies with changes in climate and prey abundance. The drier the climate, the less the prey density, and the larger the pride, the bigger the home range and *vice versa*.

Smaller, temporary sub-groups are formed in larger prides of >14 lion for hunting purposes. Each of these sub-groups restricts its activity to the home range of the larger pride.

### **Social structure**

Lion is the only living cat species that is distinctly social and lives in gregarious prides. It is only post-mature alpha males of >10 years and sick or injured lionesses that become solitary nomads. Lionesses with newborn cubs remain in solitude for the first month after birth and then rejoin the pride. Alpha females form the nucleus of lion society and lead the pride, dominating the males and the beta and sub adult females. No one lioness dominates the other alphas. Most female cubs remain in the pride for life and become either beta or alpha lionesses. A small proportion of sub adult sisters from the same litter may leave together as a fixed group once sexual maturity is reached. These sister groups become nomadic and wander across several home ranges before they reach the social maturity and rank of beta lionesses. They may then join a nomadic beta brother group and establish a new pride.

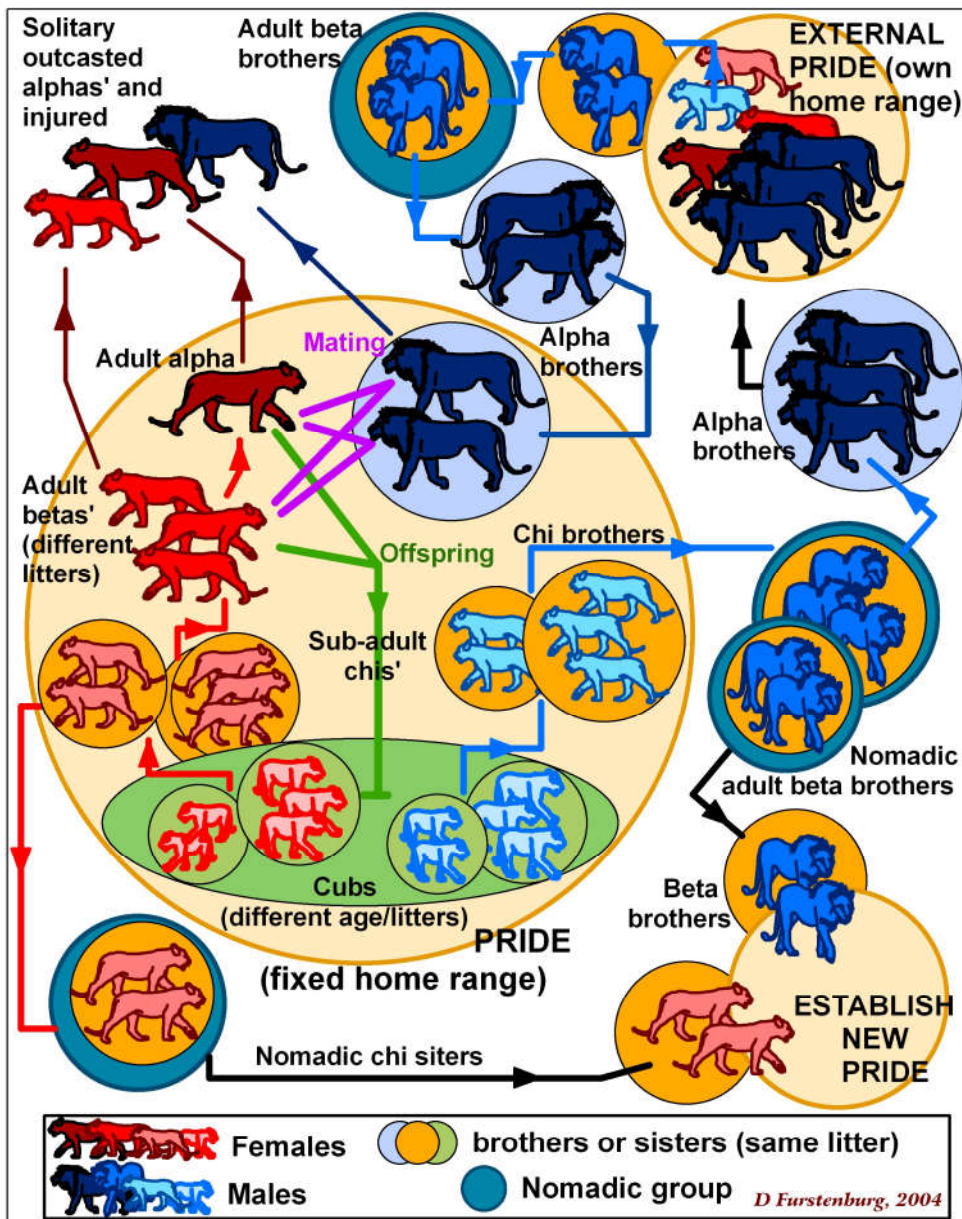
A pride consists of an external alpha brother group of 2-4 individuals, 4-10 alpha and beta lionesses of different ages, usually of the same pride and several sub-adult females and cubs of both sexes. The size of prides varies according to the density of potential prey in an area. Pride sizes were noted by the following authors

- Schaller: 4-37 adults in the Serengeti with a mean of 15
- Stander: 5-20 in the Etosha National Park with an average 12.5

- Stander: 7-12 in Kaudom Game Park in Namibia with an average of 10.8
- Prides of 8-30 were recorded in the Ngorongora Crater, Tanzania
- Viljoen: 6-16 in Chobe National Park, Botswana with an average of 11.1
- Smuts: 2-21 in the Kruger National Park with an average 11.8
- Eloff: 2-16 in the Kgalagadi Transfrontier Park with an average of 4.7

During the 1970's and 1980's, a record pride of 52 lion was documented in the Nwanedzi-Trighard region of the Kruger National Park, an area of approximately 300 000 ha. Between 1984 and 1987 the numbers of this pride had dropped to 48 and was found to split occasionally into 3-4 sub-groups when hunting for short periods of 2-4 days. During the hunting expeditions the cubs and sub-adults were left behind at a central location and were accompanied by 2-4 lactating lionesses. On one occasion the crèche was found to consist of 18 youngsters of different ages that were cared for by two alpha and one beta lioness.

On reaching sexual maturity at 20-24 months, brothers leave the pride as a group and gain beta ranking. These bachelor groups are nomadic until social maturity is reached at an age of 5 years. The group then approaches several existing prides in order to replace the existing alpha males. Once they succeed they tend to kill all existing cubs in the pride to ensure that only their own genes are passed on to future offspring. Any alpha brother of the group may mate with a willing alpha or beta lioness. The alpha brothers remain permanently with the pride for 4-5 years until they are replaced by a new, stronger brother group. There is fierce, and often fatal, fighting when a nomadic group attempts to displace the residential alpha group of a pride. Once defeated, an alpha brother group again becomes nomadic, either as an intact group or splitting into post-mature singles. Some of the young leaving a brother group may join a nomadic sister group and establish new prides.



## Reproduction

Reproduction is a direct consequence of prey density and cubs are born at any time of the year as there is no defined breeding season. In some regions minor breeding peaks may occur as a result of the availability of a large number of seasonally migrating prey. Flehmen-behaviour is apparent when the male establishes the readiness of a lioness by testing her urine with his lips. The sporadic occurrence of many equally aged cubs in a pride is the result of all the mature lionesses of both alpha and beta ranking reaching oestrus simultaneously.

Physical mating lasts 2-4 days with copulation approximately every 20 minutes. During this time the lioness ovulates 2-3 times an hour and often mates with different members of the alpha brothers resulting in cubs from different fathers in the same litter. Only 20% of matings conceive successfully. An average of three cubs (2-6) is born with closed eyes after 110 days gestation. The cubs are hidden in a den in thick shrub undercover for 6-7 weeks before being united with the pride. The den is constantly relocated by the mother who carries the cubs to it in her mouth one at a time. Lactation lasts for 6-12 months depending on the climate and prey availability. The cubs join a crèche in the pride and are constantly accompanied by 1-2 adult lionesses. Cubs move between different mothers and suckle from any lactating lioness.

### **Production**

Cub mortalities are extremely high, reaching up to 67% in the first year. They are mostly killed by leopard, hyaena, jackal and adult lion males. From an age of five months the cubs begin to accompany some of the hunts but remain at distance observing the tactics of the adults. Cubs start hunting effectively after 10 months and gain independence from the mother at 14-18 months. The expected maximum natural life span of a lion is 16 years but in captivity adults may reach an age of 25-30. Lions grow rapidly during the first three years of their lives, males reaching a maximum mass at about seven years and lionesses at 5-6 years. After this the body mass tends to decline slightly with further ageing. This phenomenon is also found in greater kudu *Tragelaphus strepciseros*.

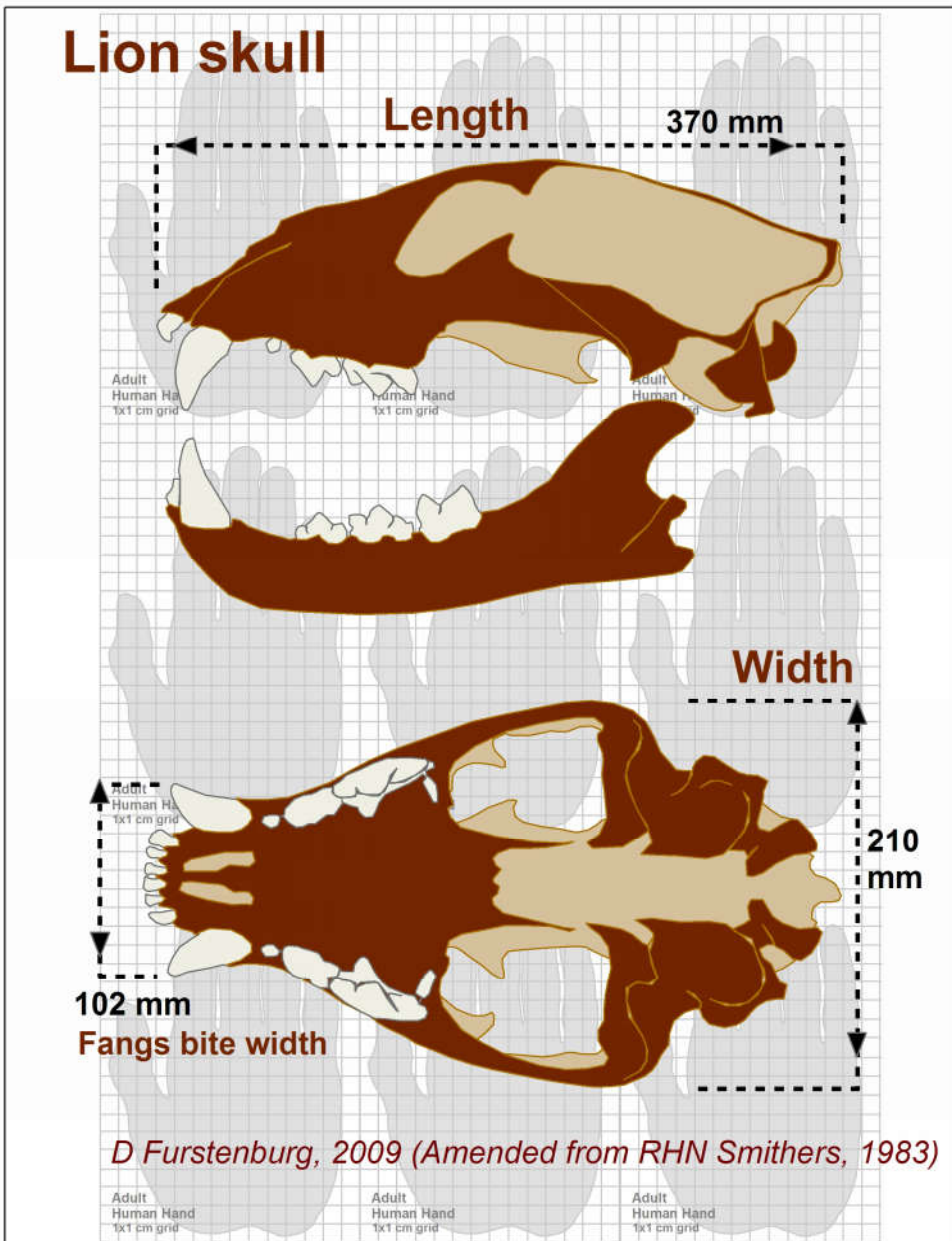
The following free roaming lion densities were recorded

- Kruger National Park: one lion per 6 850 ha
- Serengeti: one lion per 1 000 ha with a prey biomass of 1 000 kg/100 ha
- Etosha National Park one per 500 ha with a prey biomass of 12 000 kg/100 ha
- The Ngorongora Crater 0,5 per 500 ha with a prey biomass of 20 000 kg/100 ha

### **Hunting ethics**

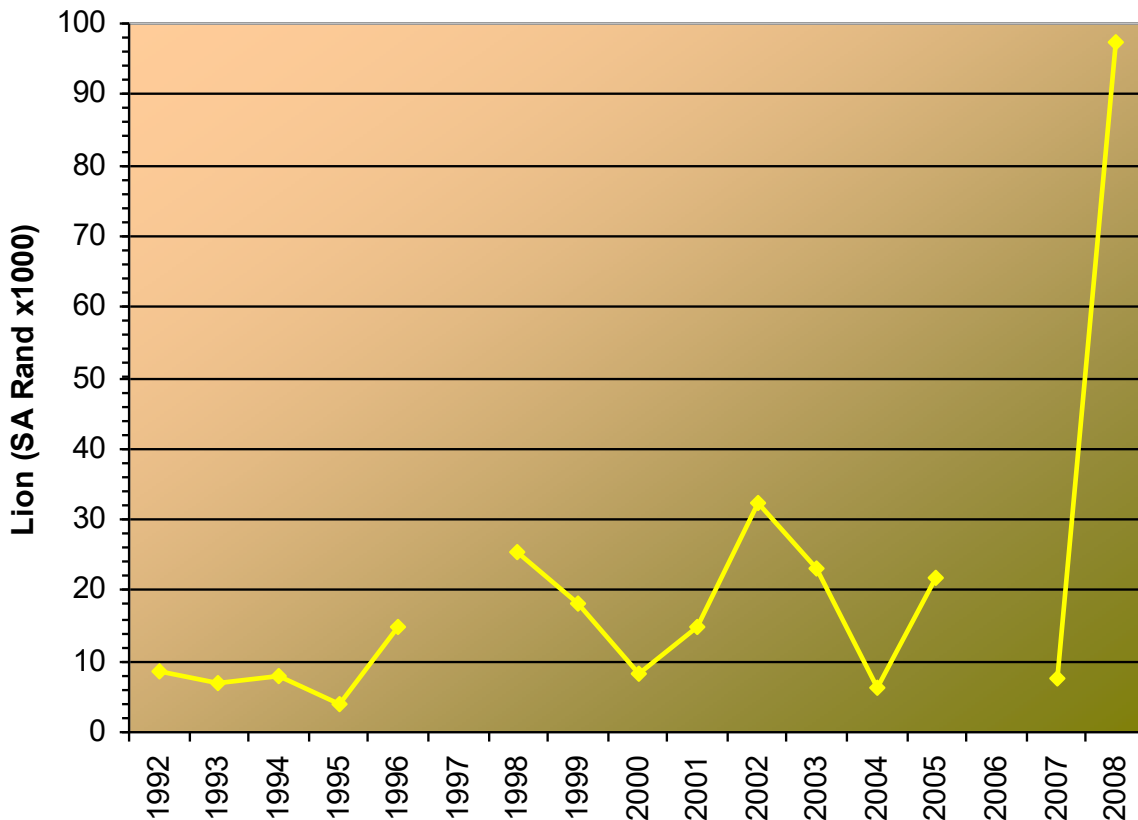
Throughout the ages the hunting of lion was a measure of human status. A recent decline in numbers has led to an era of breeding lion in captivity and, more shamefully, to the unethical practice of canned lion hunting. This type of hunting, if applied correctly and with necessary care, could have gained a recognised status within the game and hunting industry. However, the exploitive approach of some breeders who misused the ethical code of hunting resulted in provincial legislation against it. At present there are extremely tight measures that control the treatment of lion raised in captivity and released before the hunt.





## Trend in mean annual Lion auction prices

(Data from: Vleissentraal; T. Eloff, Univ. Potchefstroom; Cloete & Taljaard, Univ. Free State)



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## Gallery



Photo: Johan vd Vyver



Photos: Deon Furstenburg



Photos: Deon Furstenburg, common & white lion cubs

	<b>Deon Furstenburg</b>	f: 086 262 1032	  
	Wildlife Scientist - Risk Manager +27 72 575 3289	e: Deon@geowild.co.za	
<i>Expert support to the wildlife industry</i>		a: 3 Kiaat Str, Overkruin, Heidelberg 1441	
		p: P O Box 1802, Heidelberg 1438	