Focus on the African Elephant (Loxodonta africana)

Article · May 2010

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African Elephant

Loxodonta africana (Blumenbach, 1797)

Afrikaans	**Afrika-Olifant**
German	**Afrikanischer Elephant**
French	**eléphant d' Afrique**
isiNdebele	**Indlovu**
isiZulu	**Indlovu**
isiXhosa	**Indlovu**
seSotho	**Tlôu**
seTswana	**Tlôu**
Shona	**Nzou / Zhou**
Shangaan	**Ndlopfu**
Venda	**Ndou**
Nama/Damara	**!Khoab**
Herero	**Ndhlovu / Ndjou**

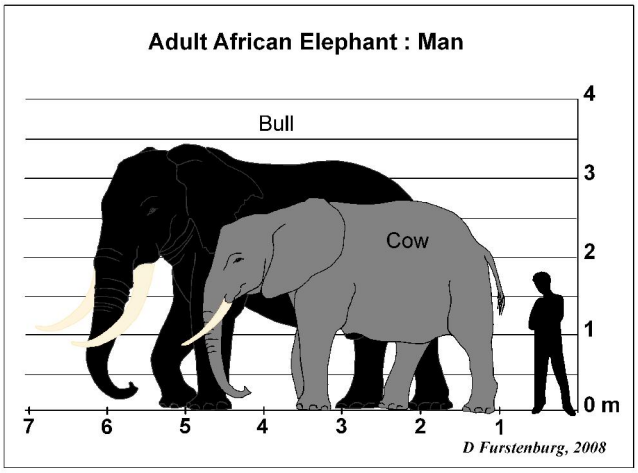


Photo: Ilse Otto, African savannah elephant bull (Addo)

IUCN Conservation Status:

African savannah elephant = Vulnerable (VU)

African forest elephant = Endangered (EN)
Asian elephant = Endangered (EN)

The number of African elephants has dwindled from millions in former times to between 470,000 and 690,000 by March 2007. Poaching for ivory has taken its toll and some African countries have reported a 65% decrease in their elephant populations. As poaching has increased by 45% since the 2007 census, the current status is critical. In Asia, there are less than 52 000 elephant left in the wild.

The African elephant is the largest of all extant land-living animals, the record being that of a bull hunted in the Qundo River valley in south-eastern Angola with a mass of 12 193 kg and a shoulder height of 4.128 m. Its closest relative is believed to be the diminutive klipdassie or hyrax which is the size of a rabbit. The English name elephant is taken from the Greek *elephas* and the Latin *elephantus*

Taxonomy

Kingdom:	ANIMALIA
Phylum:	CHORDATA
Class:	MAMMALIA
Supercohort:	AFROTHERIA
Cohort:	PAENUNGULATA
Superorder:	TETHYTHERIA
Order:	PROBOSCIDEA
Family:	Elephantidae
Family: *Moeritheridae	
Family: *Gomphotheridae	
Family: *Mastodontidae (*Mastodons)	
Family: *Dinotheridae	
Subfamily:	Eliphantinae
Subfamily: *Stegodontinae, Genus: **Stegodon*	
Subfamily: *Lophodontinae, Genus: **Stegomastodon* & *more	
Tribe:	Elephantini
Tribe: *Belodontini, Genus: **Tetrabelodon* & **Stegotetrabelodon*	
Subtribe:	Loxodontina
Subtribe: *Primelephantina, Genus: **Primelephas* & **Hypselephas*	
Subtribe; Elephantina, Genus: *Elephas* & **Mammuthus*	
Genus:	*Loxodonta*
Species:	*africana*

(* = Extinct groups & species)

Proboscids such as the elephant share a common pig-like ancestor, *Moeritherium* that lived some 60 million years ago and was widely distributed through northern Africa . *Moeritherium* was 60 cm high and had a sharp ivory tusk on both sides of its muzzle.

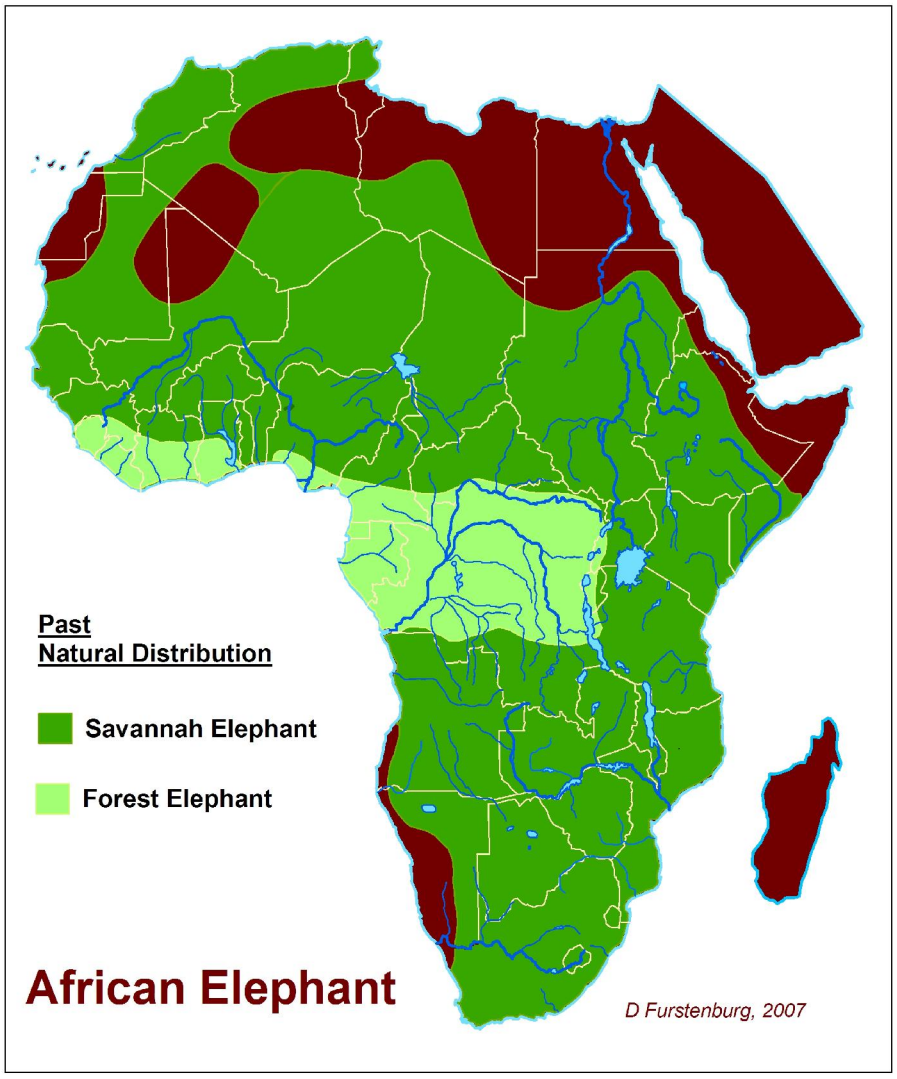
Extant animals of this order include the hyrax or klipdassie *Procavia capensis*, the dugong *Dugong dugon* and the manatee *Trichechus spp*. *Gomphotherium* evolved from *Moeritherium* and spread into Europe and Asia. In Asia *Gomphotherium* gave rise to the genus *Stegolophodon,* the stegodonts, around 4.8 million years ago. This genus became extinct about 4 100 years ago and consisted of 12 species all of which had four ivory tusks. At the same time the mastodon, which had only two ivory tusks, developed in Africa. The mastodon later gave rise to *Primelephas,* a common ancestor of the mammoths, genus *Mammuthus* with 11 species, the genus *Loxodonta* and the genus *Elephas* which includes the two extant elephant species. Two of the mammoth species were endemic to Africa, namely *M. africanayus* the African mammoth and *M. subplanifrons* the South African mammoth. European rock art depicts humans trapping the hairy mammoth *M. primigenius* and the imperator mammoth *M. imperator* in pit traps. The mammoth spread from Europe through Asia and into North America, the last individuals being killed by man in Asia around 1 650 BC. The main cause of the mammoths' extinction was global warming which caused rising sea levels that swamped the coastal regions about 12 000 years ago. The Ice Age was ebbing and forests replaced open woodlands and grasslands.

Only three elephant species and four subspecies are alive today

- *Loxodonta africana* the African savannah or African bush elephant
- *Loxodonta cyclotis* the African forest elephant, formerly referred to as *L. pumilio* or the African pygmy elephant
- *Elephas maximus* the Asian elephant with the subspecies
- *E.m. indicus* the Indian elephant
- *E.m. maximus* the Sri Lankan elephant
- *E.m. sumatrensis* the Sumatran elephant
- *E.m. borneensis* the Borneo elephant

More recently Africa hosted another subspecies *Loxodonta pharaoensis*, the North African bush elephant, also referred to as the war-elephant that was used by Hannibal between 218-201 BC during the ancient Roman Punic wars. *Loxodonta pharaoensis* became extinct between 100 and 200 AC.

Distribution



The genus *Loxodonta* is endemic to Africa. Historically, the modern African elephant was distributed across Africa, from sea level to 4 570 m. Africa also hosted mastodon and mammoth species in the past but no stegodonts. According to the African Elephant Specialist Group of the IUCN, the total African elephant population decreased to less than 360 000 by 1998 of which 200 000 were in southern Africa, south of the Zambezi River. At present, numbers are increasing but over-protection in some areas of Botswana, in the Kruger National Park and the Addo Elephant National Park has resulted in serious environmental degradation. The African elephant population of today is fragmented and is restricted to the Mediterranean coastal region of northern Africa, to central Africa, the eastern and northern parts of southern Africa and to isolated populations in West Africa. The distribution of the two extant species of the African elephant is divided between the tropical rainforest and the savannah regions.

The Asian elephant and its subspecies are mainly restricted to the rainforests of

Bangladesh, India, Sri Lanka, Indochina, Nepal, Borneo and Thailand.

Description

In contrast to most other mammals with legs that are attached to the side of the body, the legs of the elephant are positioned nearly underneath in order to support their huge mass. An elastic cushion of lipids and muscle forms an extended, flat walking surface that supports the digits of the toes. While most mammals have hollow bones, a network of bone-fibre reinforces the interior of elephant bones. However, the bone of the enormous skull is sponge-like which reduces the weight carried by the neck vertebrae. The abdominal lung cavity found in most mammals is absent in the elephant. The lungs are attached to the diaphragm and respiration is propelled by muscular movements rather than by negative air pressure. As a result, an elephant suffocates very quickly if its lungs are punctured. The testicles of males are permanently located in the body cavity and are not visible.

The African savannah elephant bull is the largest of all extant species with an adult shoulder height of 3.2-3.6 m and a body mass of 5 000-6 500 kg. Adult cows are much smaller at 2.0-2.6 m and weigh in at 2 500-2 800 kg. The bull of the African forest elephant has an adult shoulder height of 2.3-2.8 m and a mass of 2 800-3 200 kg and the cow a mass of 1 800-2 500 kg. The extinct North African elephant adult bull measured 2.5 m at the shoulder. Asian bull elephants have an average adult shoulder height of 3.2 m and cows 2.4 m. The average mass of a bull is 5 400 kg and a cow 2 700 kg.

The African forest elephant has a rounder head and ears than the African savannah elephant, its tusks are straight with dark coloured ivory and its skin is completely hairless. In contrast, the tusks of the African savannah elephant are curved and lighter, and the skin is sparsely covered with individual, hard spike-like hairs. Crossbreeding between the two species is common in areas with overlapping habitats.

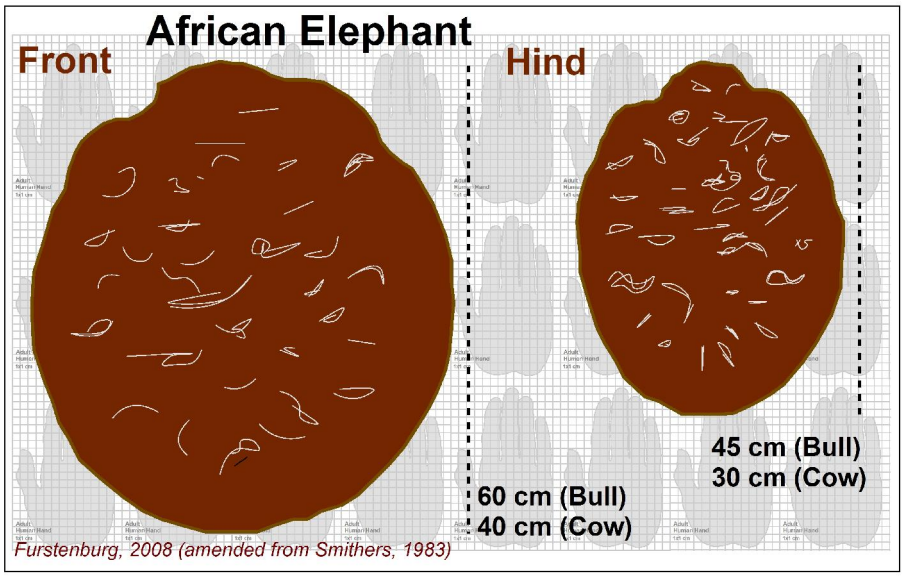
Elephants have only six molars in each cheek throughout their lifespan of which only one is functional. Once this wears down to the gum it is gradually replaced by the one behind. The first molar appears at one year, the second at two years, the third at six years, the fourth at 15 years, the fifth at 28 years and the last at 47 years. Once the sixth molar has worn out the animal dies from starvation.

The skin is 14-18 mm thick and requires constant moisturising from body liquids to sustain its elasticity. At a moderate temperature a sub-adult of 1 200 kg loses a minimum of 2.5 litres of water per hour through its skin. An adult bull loses twice as much water and requires 120 litres per day to counterbalance the effect. Resting in the shade of trees, showering the body with a spray sucked up by the trunk, and covering of the body with dust and mud, act as an essential protection against heat exhaustion. A thin layer of dried mud is eight times more efficient in cooling the body than a spray of water. The enormous ears of 1.2x1.8 m act as a heat exchange mechanism as the warm blood

circulating through their superficial veins is cooled by close contact with the exterior environment. The ears are also used to display power and aggression. The brain is the size of a rugby ball and, in contrast to other mammals where it is situated towards the posterior of the skull, the elephant's is positioned towards the anterior; in adults it is15 cm above the eyebrow. The silhouette of a cow's forehead is squarer than that of bulls. This elephant feeds with a trunk that is controlled by 40 000 muscles.

Spoor

Elephant are planti-grade, walking on flat cushions beneath the toes that form a palm. The front feet have five toes, each equipped with broad, blunt nails and the hind feet, four toes. The front spoor is rounded and has a diameter of 60 cm in adult bulls and 40 cm in adult cows. The hind spoor is oval in shape, 45 cm long in adult bulls and 35 cm in adult cows.



Furstenburg, 2008 (amended from Smithers, 1983)

Information table

African Elephant information table (F = Forest Elephant; Sav = Savannah Elephant)			
Characteristic		**Bull**	**Cow**
Adult body weight (F) (Sav)	kg	2 800 – 3 200 5 000 – 6 500	1 800 – 2 500 2 500 – 2 800
Adult shoulder height (Sav)	m	3,2 – 3,6	2,0 – 2,6
Record body sizes		4.128 m, 12 193 kg	2,9 m, 3 232 kg
Sexual maturity age	years	12 – 15	8 – 9
Social maturity age (1st mating)	years	28 – 35	9 – 18
Gestation period	months		22
1st Calf born at age	years		11 – 20

Calving interval	years		4 – 8
Rutting season		Nov – Apr	
Calving season			Sep – May
Weaning age	years	2 – 2,5	
Infertile / Post mature at age	years	45 – 50	45 – 50
Gender ratio: entire population (natural)		1	1
Gender ratio: entire population (production)		1	2
Mating ratio: adults (natural)		1	2
Mating ratio: adults (production)		1	3-4
Calf birth ratio		1	1
Maximum lifespan	years	55 – 60	55 – 60
Home range	km^2	140 – 1 200	250 – 3 800
Territory range	ha	None	None
Large stock grazing unit (adult)	LSU	6,2 per animal (28% of diet)	4,6 per animal (28% of diet)
Browsing unit (adult)	BU	16,8 per animal (72% of diet)	11,2 per animal (72% of diet)
Maximum stocking load	2 animals per 1 000 ha		
Minimum habitat size required	ha	5 000	
Annual population growth	2 – 11% (mean 7%)		

Trophy

Both sexes carry two ivory tusks. The record tusk size is 102.3 kg in males and 97 kg in females. The tusks are specialised canines that grow continually throughout the animal's lifespan although the ends wear off constantly as they dry out and splinter off. Elephant tusks are showing a trend of size reduction in modern evolutionary development and bulls with rudimentary tusks and cows without tusks are becoming more common in confined and isolated populations. This is especially evident in the populations of the Zambezi Valley, the Addo Elephant National Park and the Knysna forest. The 1989 CITES Convention banned the trade of all elephant products and, as a result, CITES permits are required for hunting.

African Elephant trophy records					
Rowland Ward (XXVII edition 2006)					
Minimum qualifying ivory mass = 80 pounds (36.29 kg)					Measuring method 16
Rank	**Pound Feet/Inch**	**Kg**	**Locality**	**Year**	**Source**
1st	226 + 214 lb 10'2½" + 10'5½"	199.6	Mt Kilimanjaro, East Afrika	1898	British Museum
2nd	198+174 lb	168.7	Lake Albert	1906	Powell-Cotton Museum

	9'9" + 8'11"				
3rd	192+189 lb 8'10½" + 8'7½"	172.8	Tanzanië	1971	Game Dept. Tanzania
4th	185+183 lb	166.9	Malawi Border	1953	H. Manners
5th	184+ ? lb 9'5" + ?	-------	----------	1891	Francis Migeon
Mammoth (*Mammuthus primigenius*) Extinct					
1st	201 lb 12'11"	91.17	Siberia, Russia	------	American Museum of National History
Safari Club International S.C.I.					
Minimum qualifying value = 100 lb (45.36 kg)				Measuring method 19	
1st	228 lb 11'5"	103.42	----------	1986	R. de Cesare
Confederation of Hunters Associations of South Africa CHASA					
Minimum qualifying value = 50 lb (22.68 kg)				Measuring method (G)	
1st	109 lb	49.44	Mozambique	1974	G. Guillaume

Habitat requirement

African savannah elephant adapt well to a broad spectrum of habitats ranging from an annual rainfall of 150 mm in desert conditions, to 1 400 mm in sub-tropical savannah environments and tropical grasslands. Swamps, marshes and open to broken woodland are preferred. At present, the largest concentrations are found in bushveld and woodland savannah. The African savannah elephant will enter thicket but, by choice, avoid forests as the feeding value and nutrition of forest vegetation is insufficient and unsuitable. In contrast, African forest elephant are mostly restricted to tropical rainforest and closed savannah in the immediate vicinity of forest.

Behaviour

Elephants are equally active during day and night and feed up to 17.8 of every 24 hours. Their main resting time is shortly before daybreak when they lie down on their sides and sleep for up to two hours. During the day elephants take short rests standing in the shade of trees. The preferred drinking time is late in the afternoon and they travel long distances in search of water and suitable feeding. They are generally passive and slow moving, walking at 10 km/hr but become severely tense and aggressive during the rut and when there are infants in the herd. Both cow and bull come in to heat, the cow in oestrus and the bull in musth. Two behavioural patterns of aggression are displayed:

- The well-known "mock charge" to chase intruders away. The elephant trumpets, holds its trunk high above its head, flaps its ears and kicks up dirt. It charges forward for a short distance, stops, turns back and then repeats the procedure.
- The purpose of a serious charge is to kill and destroy. The elephant does not trumpet but curls its trunk tightly in front of the head, pulls the ears flat against the body and

lifts the head to project the tusks forward. It then charges forward at 12.5 m/s or 45 km/hr.

The maternal instinct is extremely strong and all members of the herd display an immensely protective attitude towards both infants and young. If a young elephant dies or an infant is born dead, the herd will guard the site for several days and the mother for as long as one to two weeks. The herd will never leave a trapped youngster behind if it is still alive and tries all possible means to free it. Communal elephant graveyards where old post-mature individuals go to die are common in the wild. They have extraordinary memories and return to sites and recall situations many years later. Elephants are good swimmers and cross rivers and lakes almost completely submerged with only the tip of the trunk above the water. Their eyesight is poor but they have excellent smell and hearing.

Feeding & Nutrition

Elephants are water dependent and drink 2-3 times a day if water is readily available, or travel up to 40 km or more to reach waterholes where they drink at least once every 2.5 days. Bulls have an average water intake of 150-220 litres/day and cows, 100-150 litres/day. They are bulk or roughage feeders, the food consisting of a wide variety of browse, bark, fruit, grass, sedges and water plants. Food composition varies between 80-28% grass and 20-72% browse and is seasonal, with increased grass consumption in wet summer months and more browse in dry winter months. The preferred feeding height is 0.6-2.0 m, although adult bulls pull down branches with their trunks from as high as six metres. Depending on the habitat, an adult elephant can push over and uproot up to six trees per day in order to reach the upper canopy and fruit, or to feed on the highly nutritious and moist roots. Tree bark forms an essential part of the diet as it is rich in minerals and fatty acids. The elephant strips the bark off tree trunks with its tusks as well as chewing the branches while rolling them between its molars. The elephant has a role in seed dispersal as its leaves its dung in a different location to that in which the vegetation was consumed. In Mozambique, historical pathways are made visible by the long stretches of maroela trees standing where seeds germinated in the dung left by elephants during their travels.

The large droppings of 100-150 kg wet mass produced per day, play an important ecological role in the re-circulation of soil nutrients when dung beetles bury the dung in the soil. In areas with mineral-poor soils elephants tend to consume earth and will even dig for natural salts. For many years, elephants have been observed sourcing supplementry potassium sulphate by digging in the floors of the caves of Mount Elgon in Kenya.

The elephant's favourite grasses are medium height to tall, 16-150 cm, consisting primarily of sweet species including those of the genera *Cynodon*, *Panicum*, *Setaria*, *Cencrus*, *Themeda*, *Hyparrhenia*, *Andropogon* and *Cymbopogon*. Elephants do not thrive

in sourveld habitats, mixedveld habitats are marginal and sweetveld habitats optimal. Preferred browse includes species of the genera *Grewia*, *Acacia*, *Adansonia*, *Sterculia*, *Azima*, *Combretum*, *Colophospermum*, *Terminalia* and *Portulacaria*.

Only 44% of the dietary intake is digested in the hindgut. This method of digestion is less effective than the foregut digestion of ruminants and thus an elephant must pass large volumes of roughage through its gut in order to gain sufficient energy and nutrition. The average daily fresh food consumption of adult bulls is 250-300 kg, and cows, 150-170 kg. Because browse material contains considerable quantities of secondary toxins that are harmful to elephants they must constantly supplement their diet with grass. This problem is especially evident among the few remaining elephants that are restricted to the Knysna forest where there is a lack of grasses and forbs.

Territory & Home range

Elephants are natural migrants and move across vast areas. Home ranges are not permanent, the size depending on the type of habitat. In forests they are between 14-52 km^2, in the grassy savannah plains of Kenya they are an average of 1 800 km^2 for breeding herds and from 840-3 750 km^2 for bulls, and in the bushveld of the Kruger National Park they range between 240-720 km^2 for cows and breeding herds and 140–1 140 km^2 for bulls. During droughts elephants tend to home in on smaller ranges concentrated around permanent water sources, or along drainage lines or watercourses. No territorial behaviour is evident. The average walking distance is 12-20 km per 24hour cycle.

Social structure

Elephants live within a network of complex social relations and communicate with a comprehensive spectrum of more than 200 low-frequency (<15 Hz) vocalisations. In comparison, human hearing ranges from 30-40 Hz. The social structure is matriarchal, the oldest cow of between 38-60 years being the central figure. She keeps the herd of 3-12 members together and takes decisions regarding movements, feeding grounds and home range. The rest of the herd consists of her calves, and her older daughters and their calves. Family members are usually tightly bonded for life and older cows display considerable physical contact. Mass herds of up to 300-1 300 are a common phenomenon and are formed by the aggregation of several family herds. Individual families keep their structures within the mass herd. Physical contact is also displayed between members of different families but is less intimate.

Calves grow up in a highly protective arena where the entire family nurses them. When family herds become too large they split into sub-groups and the senior beta cows and their related offspring establish new family units. When young bulls become sexually mature at 12-16 years, they leave their mother herds and join bachelor herds of 2-35 bulls. When social maturity is reached at 25 years, a bull temporarily accompanies a family herd

during the times of his musth. Adult bulls older than 30 years are mostly solitary. Some cows also become solitary at an age of about 50 years when they are post-mature and infertile.

Musth

Bulls display a strong hierarchy of dominance. Musth usually starts when bulls reach their mid-twenties and is an annual event lasting from several days to three months. The temporal musth gland is the size of an orange and is situated in front of the ear beneath the eye. During musth a bull's testosterone level rises and a sticky oily substance is secreted that can be seen flowing down the skin. During this time it becomes extremely aggressive and agitated and searches for cows that are in oestrus. Bulls in musth have increased stamina, are temporarily dominant and prevent younger bulls coming into musth. In the absence of older bulls, young bulls develop musth at earlier age which often results in a series of intra-species conflicts as they tend to attack white rhino and buffalo. This problem is one of the reasons why new elephant introductions should not be limited to young animals only.

Reproduction

Bulls older than 27 years in musth associate with family herds for mating. More than one bull may join the same herd simultaneously. Most mating, about 70%, occurs during the summer rainy season between November and April. Cows become sexually mature after nine years. Copulations are short, 40-80 seconds, with an oestrus of 2-6 days. More than one bull usually mates a cow in oestrus. A single calf with a mass of 120-140 kg is born after a gestation of 630-660 days or 22 months. Twins occur but are rare. Other adult cows in the herd assist in the birth process and the calf starts walking after 1.5-2 hours. Calves begin to taste fresh vegetative matter after four months but only start feeding after one year. They become independent at two years but many continue to suckle partly until an age of 4-5 years. Calving intervals are dependent on the prevailing environmental conditions and vary from 4-8 years. Cows raise their calves with the support of the family but without any help from the bulls.

Production

Calf mortality before one year is 7-10%, between 1-2 years is 30-55% and thereafter 2-6% per annum. The annual population growth varies from 2-10.4% and the measured maximum animal load for optimum natural habitats is two elephant per 1 000 ha. Higher loading results in a mortality of up to 55% during droughts and seriously degrades the habitat. Management objectives and strategies must be well planned in advance because, aside from the size of the area, elephant introduction brings with it a range of problems. Responsibilities concerning the nursing, hosting and the social interaction with other animal species increase exponentially. The new management plan must encompass active habitat monitoring as well as a strategy for the control of surplus

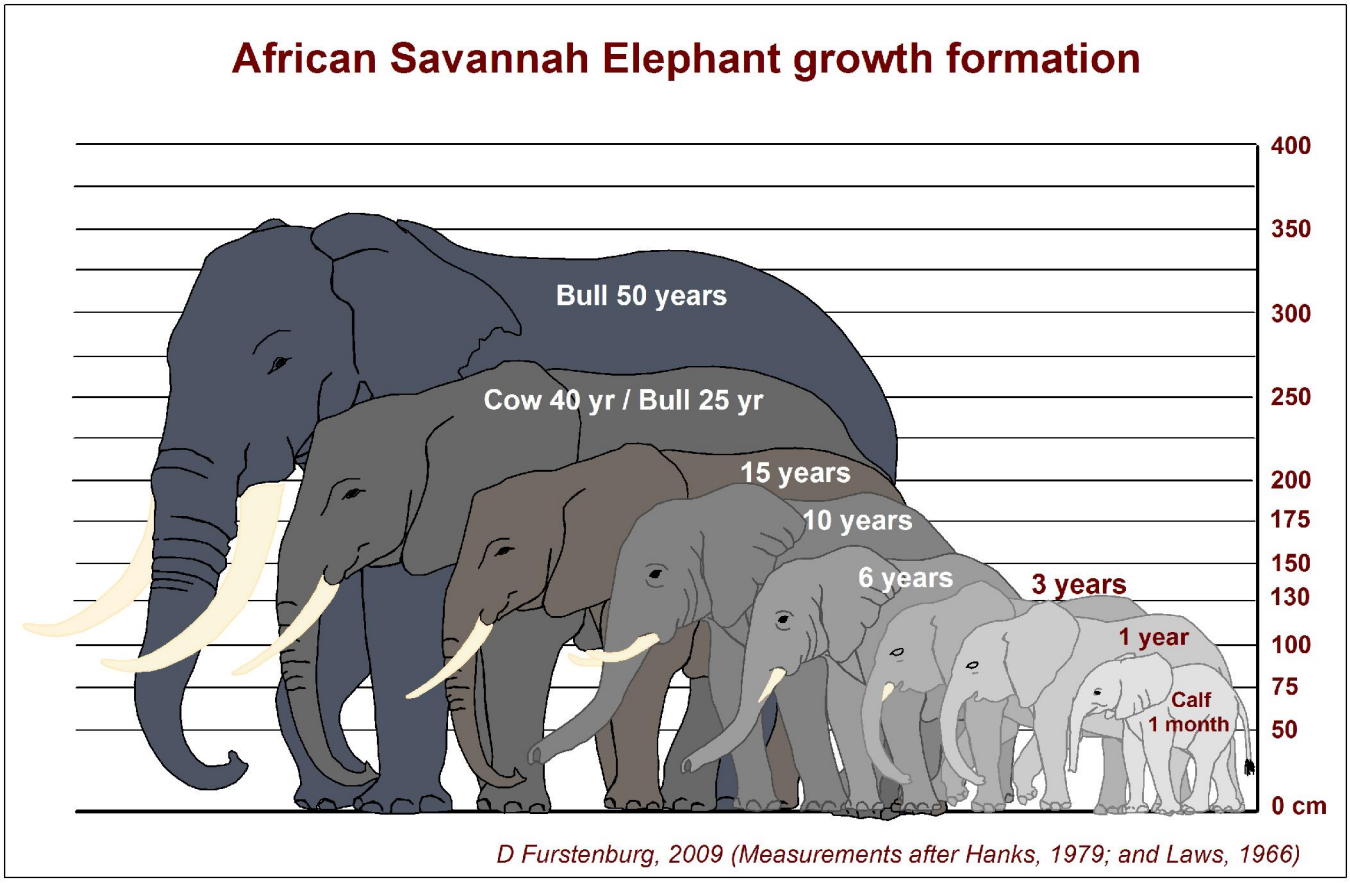
elephants. The contribution of elephant to the total animal biomass should never exceed 15%. An elephant population in its natural state can double every 15 years giving an annual growth of 6.7%.

The **"Elephant Management and Owners Association" (EMOA), PO Box 98, Vaalwater, 0530; Tel/Fax: (014) 755 4455** was established to assist elephant owners and managers.

Diseases

Floppy-trunk disease is prevalent in Zimbabwe and the Kruger National Park. Paralysis slowly advances from the tip of the trunk towards the head, causing the animal to starve to death. Salmonella causes diarrhoea, fever and death, especially in captive elephants. They are also susceptible to foot-and-mouth disease. When elephants walk through the veld immediately after a burn or are trapped during fires, severe tissue burns of the foot and lower legs brings them to a standstill. This is followed by death due to dehydration and infection.

Mean annual South African live sale auction prices for African Elephant		
Year		**S.A. Rand per animal**
1)	1993	R12 500
2)	1994	----
3)	1995	R10 000
4)	1996	----
5)	1997	----
6)	1998	----
7)	1999	----
8)	2000	R12 500
9)	2001	R10 000
10)	2002	----
11)	2003	----
12)	2004	----
13)	2005	R24 762
14)	2006	----
15)	2007	----
16)	2008	----



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Gallery

Photo: Ilse Otto, adult African savannah elephant bull (Addo)

Photo: Alan Minnaar, African savannah elephant cow, juvenile & infant

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