

PEST RISK ASSESSMENT

African Lion

Panthera leo



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About this Pest Risk Assessment

This pest risk assessment is developed in accordance with the *Policy and Procedures for the Import, Movement and Keeping of Vertebrate Wildlife in Tasmania* (DPIPWE 2011). The policy and procedures set out conditions and restrictions for the importation of controlled animals pursuant to S32 of the *Nature Conservation Act 2002*. This pest risk assessment is prepared by DPIPWE for use within the Department.

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I. Summary

African Lions (*Panthera leo*) are large carnivorous felines native to a wide area of Africa and southwest Asia. The species historically occurred in Europe, much of Asia and all of Africa, although today African Lions are limited to areas of Africa and the Gir Forest of India.

African Lions pose a significant threat to human safety and may make unprovoked and fatal attacks on humans. The species is also noted for preying on livestock, particularly if their native food sources are scarce. The economic impact of stock raiding in this species can be significant. In addition, the species is vulnerable to a variety of diseases which can be transferred to humans.

Climate modelling indicates a moderately suitable match for the species in east and northwest Tasmania. Should African Lions become established in Tasmania, the species poses a significant threat to a wide range of wildlife. Larger mammals are likely to be heavily impacted, although numerous native species may be opportunistically preyed upon. Agricultural stock is likely to be impacted.

The African Lion is currently listed as “vulnerable” under the IUCN Red List. Under the *Environment Protection and Biodiversity Conservation Act 1999*, the species is listed as ‘specimens taken to be suitable for live import’ and requires a permit to import issued under this Act. Eligible imports are for non-commercial purposes only (i.e. zoos) and exclude household pets.

The species is classed as a ‘serious’ threat under the Vertebrate Pest Committee’s list of exotic animals (Vertebrate Pest Committee, 2007).

In Tasmania, the African Lion is a ‘controlled animal’ under the *Nature Conservation Act 2002*.

This risk assessment concludes that African Lions are an ‘extreme’ threat to Tasmania and recommends that imports be prohibited.

2. Introduction

2.1 NAME AND TAXONOMY

Kingdom:	Animalia
Phylum:	Chordata
Class:	Mammalia
Order:	Carnivora
Family:	Felidae
Genus:	Panthera
Species:	<i>P. leo</i> (Linnaeus, 1758).



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Sub-species or variety (if applicable): Taxonomic accounts of this species differ. Two sub-species, *P. leo leo* (African Lion), and *P. leo persica* (Asiatic Lion) are widely recognised. A further six sub-species are disputed: *P. l. senegalensis*, *P. l. azandica*, *P. l. nubica*, *P. l. bleyenberghi*, *P. l. krugeri*, *P. l. melanochaita*.

Common names (including any industry or trade names): African Lion; Lion.

Known hybrids: African lions have been bred with Tigers, Leopards and Jaguars in captivity. There is no definitive evidence of hybrids occurring in the wild.

Close relatives: Tiger (*P. tigris*), Leopard (*P. pardus*), Jaguar (*P. onca*).

2.2 DESCRIPTION

African Lions are large felines with a shoulder height of 1-1.2m and a body length of 1.4-2.5m. The black-tufted tail varies from 0.7-1m in length. Females weigh up to 182kg, while males are typically larger and may weigh up to 272kg (Long 2003).

The coat colour varies from buff to yellowish or reddish brown, with pale underparts. Males possess a long, hairy mane which may be light yellow to black (Long 2003). The mane develops as males reach maturity, and is unique to this species.

Cubs have a similar appearance to adults and may have pale spot-like markings on their body that fade with age.

African lions have been bred with Tigers, Leopards and Jaguars in captivity. There is no evidence of hybrids occurring in the wild.

2.3 CONSERVATION AND LEGAL STATUS

CONSERVATION STATUS

The African Lion is currently listed as “vulnerable” under the IUCN Red List. The species historically occurred in Europe, much of Asia and the majority of Africa, although the species’ range has declined and today African Lions are limited to areas of Africa and the Gir Forest of India (Long 2003). Over the past two decades, the species population is suspected to have reduced by 30% due to indiscriminate killing in defence of life and livestock and depletion in primary prey resources (Bauer *et al.* 2008).

LEGAL STATUS

P. leo is included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (UNEP-WCMC, 2011). The Endangered Asiatic Lion subspecies *P. leo persica* is included in CITES Appendix I.

Under the *Environment Protection and Biodiversity Conservation Act 1999*, the African Lion is listed as ‘specimens taken to be suitable for live import’ and require a permit to import issued under this Act. Eligible imports are for non-commercial purposes only (i.e. zoos) and exclude household pets.

The species is classed as a ‘serious’ threat under the Vertebrate Pest Committee’s list of exotic animals (Vertebrate Pest Committee, 2007).

In Tasmania, the African Lion is a ‘controlled animal’ under the *Nature Conservation Act 2002*.

3. Biology and Ecology

3.1 LIFE HISTORY

African Lions may breed throughout the year, with peak breeding occurring during March-July. Males reach sexual maturity at 2.5 years, while females mature earlier at 2 years of age. Females have multiple reproductive cycles per year, with oestrus lasting for approximately four days. The inter-birth interval is 11-25 months (Long 2003).

Gestation is typically 100-119 days and between one to six young may be born. Young are born with their eyes closed, and these open within the two weeks following birth (Long 2003). Weaning occurs at six to seven months.

African Lions may live to 12-18 years in the wild and 13-30 years in captivity (Long 2003).

Sperm storage is not noted in this species. African lions have been cross-bred with Tigers, Leopards and Jaguars in captivity, although there is no evidence of hybrids occurring in the wild.

3.2 HABITAT REQUIREMENTS AND PREFERENCES

The African Lion occupies a broad range of habitat and shows a preference for grassy plains, savannahs, open woodlands and scrub country (Nowak 1999). Throughout the species' range, it is absent only from tropical rainforest and the interior of the Sahara desert. African Lions may be found at elevations of more than 4,000m, and have been noted on the Bale Mountains and on Mount Kilimanjaro (Nowell and Jackson 1996, West and Packer in press, cited in Bauer *et al.* 2008). The species can survive in very arid environments and drink regularly when water is available. Lions are capable of obtaining their moisture requirements from prey and even some plants, such as melons (Bauer *et al.* 2008). African Lions may climb trees, but do not use tree hollows.

3.3 NATURAL GEOGRAPHIC RANGE

African Lions are native to a wide area of Africa and southwest Asia. The historic range of the species is significantly greater than the current range. The species historically occurred in Europe, much of Asia and the majority of Africa, although today African Lions are limited to areas of Africa and the Gir Forest of India (Long 2003).

Figure 1. Native resident range of the African Lion (*Panthera leo*), (modified from Long 2003). Black areas show the current native range for the species while grey areas show the former historic range.



3.4 INTRODUCED GEOGRAPHIC RANGE

There are no confirmed introductions of the African Lion outside the species' natural range. In India, the Asiatic Lion has been introduced into an area of its former range as a conservation measure. It is likely that the species has been deliberately introduced to some islands, including Aru and Seram in the Maluku Islands of eastern Indonesia. Some successful re-introductions have been noted. African Lions have been re-introduced into Botswana, Kenya, South Africa and Zimbabwe (Long 2003).

3.5 POTENTIAL DISTRIBUTION IN TASMANIA

Using modelling applications by the Bureau of Rural Science (DAFF), climate is compared between the species' current and historic distribution and its potential Australian distribution (shown in Figure 2). The east and northwest regions of Tasmania show a moderately suitable match.

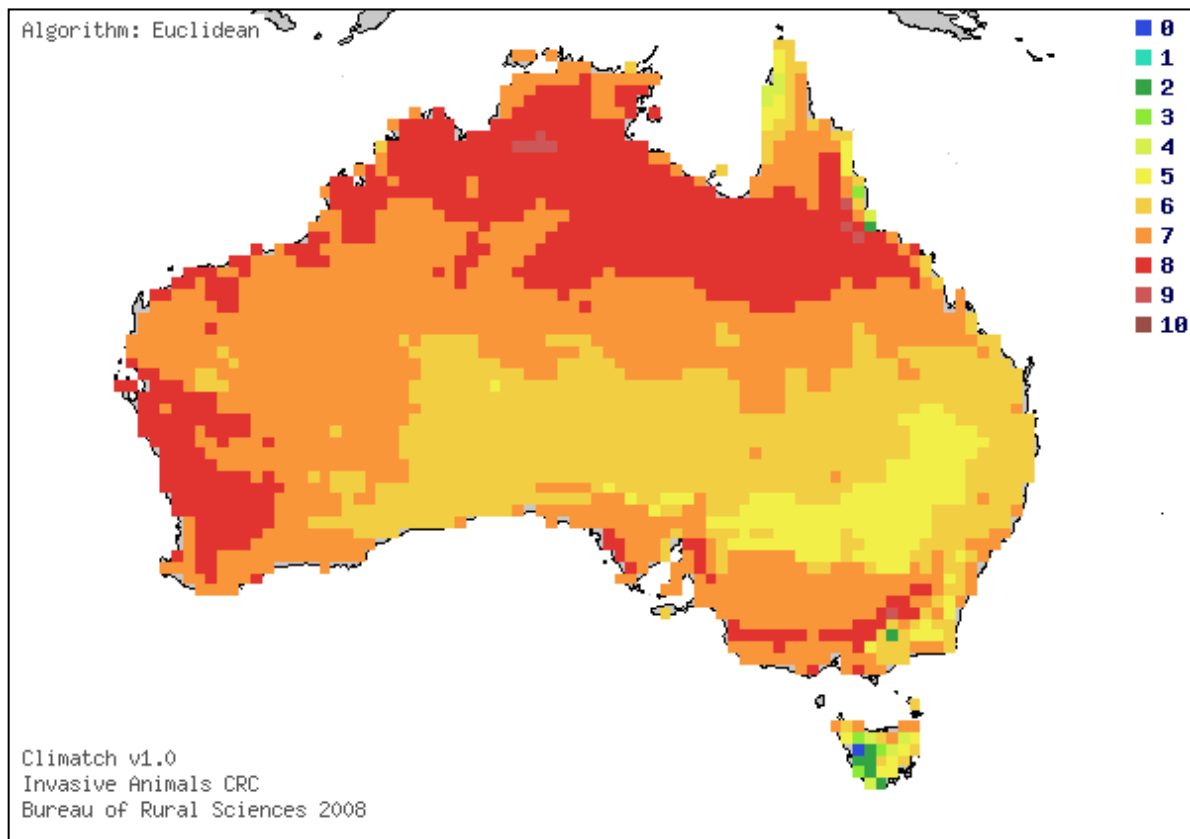


Figure 2. Climate comparison between the natural range of *P. leo* and Australia, where 10 is a 'perfect' climate match and 0 is having a very dissimilar climate. Tasmania shows a match of 0 – 7 (Source: Long 2003).

3.6 DIET AND FEEDING BEHAVIOUR

African Lions are carnivorous predators. Large mammals such as Sable, Kob, Roans, Impala, Hartebeest, Waterbuck, Buffalo, Zebra, Wildebeest, Springbok make up the bulk of their prey, but adults will opportunistically take almost any animal, including small rodents, ostriches and their eggs, and tortoises (Long 2003; Eloff 1984). African Lions actively hunt prey but may also scavenge and may displace other predators, such as the Spotted Hyaena, from their kills.

The feeding range of this species is large. Individuals may range from 0.5-11.2km in one night (Long 2003). There is a high potential for this species to feed on a variety of agricultural livestock species.

3.7 SOCIAL BEHAVIOUR AND GROUPINGS

Lions are highly social animals. Related females remain together in prides, and related and unrelated males form coalitions competing for tenure over prides. The average pride contains four to six adults, and prides generally break into smaller groups when hunting (Bauer *et al.* 2008). Adults may live in varying densities, from 1.5 adults per 100km² in southern African semi-desert to 55 per 100km² in parts of the Serengeti (Sunquist and Sunquist 2002, cited in Bauer *et al.* 2008). A pride's range can vary within the same region, and may be as large as 20,500km² (West and Packer *in press*, cited in Bauer *et al.* 2008).

Males compete for access to females, and aggressive behaviour may include roaring, chasing, wounding and even killing rival males (Schaller 1972, cited in Grinnell 2002). Both sexes are aggressive towards rival males who may kill cubs, but are also territorial. Defensive territorial behaviour may include patrolling the territory, scent-marking, and chasing and attacking intruders (Grinnell 2002). Females defend a traditional territory against other female prides to maintain access to important resources such as secure denning sites, reliable water sources and prey (Packer 1986, cited in Grinnell 2002).

3.8 NATURAL PREDATORS AND DISEASE

African Lions have few natural predators, although lone individuals may be opportunistically killed by groups of Spotted Hyaenas and cubs may potentially be taken by large birds of prey. Male lions may also kill cubs of rival males (Grinnell 2002). There are no significant predators of this species in Tasmania.

Lions are vulnerable to a variety of parasitic and other disease conditions, including ticks, sarcoptic mange, tuberculosis, avian influenza, anthrax and ricketts (Young 1975; Pavlin *et al.* 2009). In Africa, populations are vulnerable to blood-sucking stable flies (*Stomoxys calcitrans*) and populations may crash during outbreaks of these flies (Kissui and Packer 2004).

3.9 THREAT TO HUMAN SAFETY

Lions pose a significant threat to human safety and may make unprovoked and fatal attacks. For example, in parts of southeastern Tanzania, up to 400 people have been killed during 1997-2007 (Ikanda 2007, cited in Bauer 2008).

The species is vulnerable to a variety of diseases which can be transferred to humans, including tuberculosis, anthrax, Rift Valley fever virus, echinococcus and avian influenza (Pavlin *et al.* 2009).

3.10 HISTORY AS A PEST

The species is noted for preying on livestock, particularly if their native food sources are scarce and the economic impact of stock raiding can be significant (Long 2003). Annual cattle loss due to African Lions in areas near Waza National Park in Cameroon were estimated to represent more than 22% of financial losses (Bauer 2003 cited in Bauer 2008). Consequently, African Lions are actively persecuted in livestock areas across Africa and are vulnerable to poisoned carcasses put out to eliminate predators (Bauer 2008).

This species is not known to spread rapidly following release in a new environment.

3.11 POTENTIAL IMPACT IN TASMANIA

Should African Lions become established in Tasmania, the species poses a significant threat to a wide range of wildlife, including threatened species such as the Tasmanian Devil (*Sarcophilus harrisii*) and New Holland Mouse (*Pseudomys novaehollandiae*). Larger mammals are likely to be heavily impacted, although numerous native species may be opportunistically preyed upon.

Agriculture is likely to be significantly impacted, as the species is known to consume a variety of livestock.

4. Risk Assessment

4.1 PREVIOUS RISK ASSESSMENTS

The species is assessed as a 'serious' threat under the Vertebrate Pests Committee's list of exotic animals (Vertebrate Pests Committee, 2007).

4.2 RISK ASSESSMENT

The following risk assessment determines the risk of the African Lion (*Panthera leo*) to Tasmania using the Bomford model (2008) and proposes assigned threat categories and import classifications for the species.

Species:	African Lion (<i>Panthera leo</i>)	
Date of Assessment:	October 2011	
Literature search type and date:	See references	
Factor	Score	
A1. Risk posed from individual escapees (0-2)	2	<i>Animal that is capable of causing serious injury (requiring hospitalisation) or fatality.</i> African Lions have been involved in hundreds of verified human fatalities.
A2. Risk to public safety from individual captive animals (0-2)	0	<i>Nil or low risk (highly unlikely or not possible).</i> The risk to public safety from irresponsible use of products obtained from this species is low.
Stage A. Risk posed by individual animals (risk that a captive or escape animal would harm people)	Public Safety Risk Score = A1 + A2 = 2	Public Safety Risk Ranking A ≥ 2, Highly Dangerous A = 1, Moderately Dangerous A = 0, Not Dangerous = Highly Dangerous
B1. Climate match score (1-6)	4	<i>High climate match score.</i> Sum of squares for match classes 10 to 6: 11 (high).
B2. Exotic population established overseas score (0-4)	0	<i>No exotic populations ever established.</i> No populations are known to have established outside their native range.
B3. Overseas range size score (0-2)	1	<i>Overseas range class of 1-70 million km, (includes current and past 1000 years, natural and introduced range.</i> Range is estimated at approximately 4 million km ² .

B4. Taxonomic class score (0-1)	1	<i>Mammal.</i>
Stage B. Likelihood of establishment (risk that a particular species will establish a wild population in Tasmania)	Establishment Risk Score = B1 + B2 + B3 + B4 = 6	Establishment Risk Ranking B = 11-13, Extreme B = 9-10, High B = 6-8, Moderate B ≤ 5, Low = Moderate
C1. Taxonomic group (0-4)	2	<i>Mammal of the order Carnivora.</i>
C2. Overseas range size (0-2)	0	<i>Overseas geographic range class <10 million km².</i>
C3. Diet and feeding (0-3)	3	<i>Mammal that is a strict carnivore (eats only animal matter) and arboreal (climbs trees for any reason).</i>
C4. Competition for native fauna for tree hollows (0-2)	0	<i>Does not use tree hollows.</i>
C5. Overseas environmental pest status (0-3)	0	<i>Never reported as an environmental pest in any country or region.</i>
C6. Climate match to areas with susceptible native species or communities (0-5)	3	<i>25% of the geographic range of one or more susceptible native species or ecological communities that are listed under Tasmanian legislation lies within the mapped area of the six climate match classes (10, 9, 8, 7, 6 and 5).</i>
C7. Overseas primary production (0-3)	2	<i>Moderate pest to primary production. Lions may prey on livestock.</i>
C8. Climate match to susceptible primary production (0-5)	5	<i>High climate match score to susceptible primary production.</i>
C9. Spread disease (1-2)	2	<i>Mammal.</i>
C10. Harm to property (0-3)	0	<i><\$100,000 per year. No significant damage to property has been noted.</i>
C11. Harm to people (0-5)	5	<i>Injuries or harm moderate, severe or fatal and many people at risk.</i>
Stage C. Consequence of Establishment (risk that an established population would cause harm)	Consequence Risk Score = sum of C1 to C11 = 22	Consequence Risk Ranking C > 19, Extreme C = 15-19, High C = 9-14, Moderate C < 9, Low = Extreme
ASSIGNED THREAT CATEGORY:	EXTREME	
PROPOSED IMPORT CLASSIFICATION:	PROHIBITED	

5. Risk Management

Based on the outcomes of the risk assessment, it is recommended that the African Lion (*Panthera leo*) be placed on the list of species that are prohibited imports because they represent an extreme threat to Tasmania.

6. References

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7. Appendices

APPENDIX A: CALCULATING TOTAL COMMODITY DAMAGE SCORE

Column 1	Column 2	Column 3	Column 4	Column 5
Industry	Commodity Value Index (CVI)	Potential Commodity Impact Score (PCIS, 0-3)	Climate Match to Commodity Score (CMCS, 0-5)	Commodity Damage Score (CDS columns 2 x 3 x 4)
Cattle (includes dairy and beef)	11	3	4	132
Timber (includes native and plantation forests)	10	N/A		
Aquaculture	6	N/A		
Sheep (includes wool and meat)	5	3	4	60
Vegetables	5	N/A		
Fruit (includes wine grapes)	5	N/A		
Poultry (including eggs)	1.5	3	4	18
Cereal grain (includes wheat, barley, sorghum etc)	1	N/A		
Other crops and horticulture (includes nuts and flowers)	1	N/A		
Pigs	1	3	4	12
Bees (includes honey, beeswax, and pollination)	0.5	N/A		
Oilseeds (includes canola, sunflower etc)	0.5	N/A		
Grain legumes (includes soybeans)	0.3	N/A		
Other livestock (includes goats and deer)	0.3	3	4	3.6
Total Commodity Damage Score (TCDS)				225.6

APPENDIX B: ASSIGNING SPECIES TO THREAT CATEGORIES

A: Danger posed by individual animals (risk a captive or escaped individual would harm people)	B: Likelihood of establishment (risk that a particular species will establish a wild population in Tasmania)	C: Consequence of establishment (risk that an established population would cause harm)	Threat category	Implications for any proposed import into Tasmania
Highly, Moderately or Not Dangerous	Extreme	Extreme	Extreme	Prohibited
Highly, Moderately or Not Dangerous	Extreme	High		
Highly, Moderately or Not Dangerous	Extreme	Moderate		
Highly, Moderately or Not Dangerous	Extreme	Low		
Highly, Moderately or Not Dangerous	High	Extreme		
Highly, Moderately or Not Dangerous	High	High		
Highly, Moderately or Not Dangerous	Moderate	Extreme		
Highly, Moderately or Not Dangerous	High	Moderate	Serious	Import restricted to those license holders approved for keeping serious threat species
Highly, Moderately or Not Dangerous	High	Low		
Highly, Moderately or Not Dangerous	Moderate	High		
Highly Dangerous	Moderate	Moderate		
Highly Dangerous	Moderate	Low		
Highly, Moderately or Not Dangerous	Low	Extreme		
Highly, Moderately or Not Dangerous	Low	High		
Highly Dangerous	Low	Moderate		
Highly Dangerous	Low	Low		
Moderately or Not Dangerous	Moderate	Moderate		
Moderately or Not Dangerous	Moderate	Low		
Moderately or Not Dangerous	Low	Moderate		
Moderately Dangerous	Low	Low		
Not Dangerous	Low	Low	Low	Import permitted
Unknown	Any value	Any value	Extreme until proven otherwise	Prohibited
Any Value	Unknown	Any value		
Any Value	Any value	Unknown		
Unassessed	Unassessed	Unassessed		



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