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**Department of the Environment,
Water, Heritage and the Arts**

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Conservation Act 1999***
Part 13A

**Draft environmental assessment of the
suitability of the import of the Savannah Cat
(Domestic Cat x Serval hybrid specimens)
into Australia**

19 June 2008

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Draft environmental assessment of the suitability of the import of the Savannah Cat (Domestic Cat x Serval hybrid specimens) into Australia

Introduction

The Minister for the Environment, Heritage and the Arts, the Hon Peter Garrett AM MP has formulated a proposal under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to amend the *List of Specimens taken to be Suitable for Live Import* (live import list).

This draft assessment report has been prepared by the Department of the Environment, Water, Heritage and the Arts (DEWHA) against the terms of reference at Appendix 1. The report is available for public comment for 20 business days, closing on 17 July 2008. Details of the invitation to comment and how to respond are available on the DEWHA website at:

<http://www.environment.gov.au/biodiversity/trade-use/invitecomment/index.html>

The purpose of releasing this report is to provide an opportunity for public comment on the matters raised. Comments received and any relevant additional information provided will be considered by DEWHA in finalising the assessment report. Relevant state and territory ministers and the Australian Government Minister for Agriculture, Fisheries and Forestry have also been invited to comment on the draft assessment report.

The final assessment report is required to be provided to the Minister for the Environment, Heritage and the Arts for consideration prior to the Minister making a decision on whether or not to amend the EPBC Act live import list.

The Minister is also required to consider the precautionary principle under Part 16 of the EPBC Act prior to making a decision.

While Domestic Cats and feral Domestic Cats are established in Australia, this report focuses on whether the proposed amendment to prohibit Savannah Cats would be valuable in the long term for the protection of the Australian environment. The report addresses this by referring to available scientific and other literature drawing on the known impacts of feral Domestic Cats and relating these to Savannah Cats where information is lacking.

The remainder of the report follows the terms of reference. Additional information is provided in appendices.

1 Taxonomy of the original species used in the hybrid cross

The Savannah Cat is a cross between the Serval (*Felis serval*) and the Domestic Cat (*Felis catus*). As each generation of the Savannah Cat (hybrid) will receive genes from each parent, the taxonomy of both species used in the original cross have been listed below.

The Savannah Cat is not a species in itself but the taxon would be *F. catus* X *F. serval*. At present, the Savannah Cat has not been classified as a breed of Domestic Cat due to the absence of a stable generational cross that does not vary substantially in the phenotypes (temperament and appearance) of the offspring (Sino 1995-2008).

Serval (*Felis serval*)

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Felidae

Genus: *Felis* (latest synonym *Leptailurus* also *Leopardis* Johnson *et al.* 2006)

Species: *F. serval* (Schreber, 1776)

Domestic Cat (*Felis catus*)

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Carnivora

Family: Felidae

Genus: *Felis*

Species: *F. catus* (Linnaeus, 1758)

The taxonomy of the Savannah Cat is based on breeding the Serval with a Domestic Cat. However, the taxonomy may change if bred with other small felines including hybrids (Appendix 2 Table 1). Several cat breeders provide information on the internet that indicates Maine Coons, Ocicats (large varieties of Domestic Cats), and Bengals (Hartwell 2007 as cited in Olsen and Jenz 2007) have been used to produce a type of Savannah Cat in the later generational crosses. Therefore, the lineage is not guaranteed to be solely derived from crosses with the Domestic Cat. One issue with using other wildcat hybrid specimens or larger breeds in crosses is their larger sizes e.g. Maine Coons have been recorded at sizes greater than one metre long. This means that the crosses could result in larger offspring than would generally result from a cross with a standard Domestic Shorthair Cat.

Appendix 2, Table 1 provides the known Domestic Cat-wild cat hybrid crosses. Table 2 provides information on specimens listed on Part 2 of the EPBC Act live import list which may form hybrids.

2 Status and restrictions on movement of the Savannah Cat under CITES

2.1 Status of the Savannah Cat

The Savannah Cat is not listed in its own right under the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES).

However, the CITES resolution at Appendix 3 treats hybrid animals that have in their recent lineage (last four generations) one or more specimens of species that are included in CITES Appendix I or II as subject to the provisions of the Convention, as if they were full species even if the hybrid concerned is not specifically included in the Appendices.

The CITES status of the Serval and Domestic Cat from which the Savannah Cat is derived are described below.

2.2 Status of the Serval (*Felis serval*)

The Serval (*Felis serval*) is listed as an Appendix II species under CITES. A CITES Appendix II species is a species that, although not threatened with extinction now, might become so unless trade in them is strictly controlled and monitored. Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild. (Refer to Article IV of the Convention).

In the case of the Serval (*F. serval*), the import of this CITES specimen into Australia is controlled by its listing on Part 2 of the EPBC Act live import list. The restriction on listing is for the purpose of “eligible non-commercial purposes only, excluding household pets”. Eligible non-commercial purposes include research, education, exhibition, conservation breeding or propagation and a traveling exhibition. Strict criteria apply to recognition of these eligible purposes. An EPBC Act import permit is required before a Serval specimen may be imported into Australia and further restrictions may be applied on the import permit.

The Serval is currently only maintained in Zoos in Australia under high security facilities. There is a limited long term management program for the Serval, with a population of less than 20 specimens.

2.3 Status of Domestic Cat (*Felis catus*)

Domestic Cats are not listed under CITES.

3 Ecology of the Savannah Cat

3.1 Characteristics

3.1.1 Savannah Cat

The Savannah Cat is a tall lean cat with striking, large, dark spots and other bold markings on their coats. Coats are short to medium length with colour variations from black, brown, spotted tabby, silver spotted tabby, orange, gold and black smoke. They have exceptionally long necks, legs and ears, as well as a medium length tail. The head is small in proportion to the body and the back legs are slightly longer than the front legs.

Their temperament is described as intelligent, playful, energetic, assertive and even dog-like. Savannah Cats often greet people with head-butts, or an unexpected pounce. A noted trait of the Savannah Cat is its jumping ability. They have been known to jump on top of doors, refrigerators and high cabinets – some Savannah Cats can leap about 2 metres high from standing position (Krautheim 2007).

Male Savannah Cats tend to be larger than females. Early generation Savannah Cats may weigh 4.5 to 11 kgs. Size is also very dependent on generation and sex, with F₁ male cats usually being the largest. Later generation Savannah Cats are usually between 3.5–7.7 kgs. Because of the random factors in Savannah Cat hybrid genetics, there can be significant variation in size, even in one litter. Some breeders report Savannah Cats in excess of 13.5 kgs, with at least one breeder claiming an over 18 kg male. However, this may be dependent on the generation.

Savannah Cats are the result of selective breeding to establish desirable features (e.g. large ears or wild-looking colouration and patterns) or temperament suitable for demand of the companion cat market. Their size and weights will be the result of this and may vary according to the preferences of individual breeders and market demand.

3.1.2 Domestic Cat

The average measurement of the Domestic Cat tends to be 460mm head to body length (or between 400mm and 600mm) and a tail length of 300mm. Males are generally larger than females, with average weights of 4.5kg and 3.3kg respectively, but have been known to attain 8kg or heavier in some of the larger breeds such as Maine Coons. Male feral Domestic Cats have been known to weigh from 3.4 to 6.4 kg (average weight 4.5 kg) and adult females from 2.4 to 4.4 kg (average weight 3.2kg).

3.1.3 Serval

The Serval is one of seven species of small to medium-sized African wild cats (Honolulu Zoo undated website). The head and body length of the species is 670-1000mm; the tail is 230-450mm. The shoulder height is 540-620mm and weight ranges from 8.7 to 18kg, with males generally being larger than females (Nowark 1991).

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The colouring of the coat ranges from off-white to dark gold, with the under parts being paler. The entire coat is covered with small dark spots, or large spots that merge into longitudinal stripes on the back of the head. The tail is ringed by several stripes, and has a black tip (Cat Survival Trust 2002).

The build is light, with long neck and legs, and the ears are large and rounded.

3.2 Natural geographic range

3.2.1 Savannah Cat

The Savannah Cat does not occur naturally in the wild, as it is a hybrid that is the result of selective breeding in captivity.

The extent that the Savannah Cat is held in captivity overseas is unknown other than its development in the United States of America and importation into and breeding in the United Kingdom. There are none known to have been imported into Australia, although other hybrids such as the Bengal have been imported and bred in Australia for sale as companion cats.

3.2.2 Serval

The Serval is found in many parts of Africa, excluding the arid desert regions to the north around the Sahara, parts of the western tip of Southern Africa and certain areas of the tropical rainforest belt of Central Africa (Garman 1997).

Serval habitat ranges from dry open plain grasslands through to woodland savannah and the moister areas around rainforests. It occurs in mountainous areas up to 3500 metres (Cat Survival Trust 2002).

3.2.3 Domestic Cat

The Domestic Cat has been widely distributed by human activity throughout most of the available habitats across the world including islands (Pest Animal Control CRC *et al.* undated website; Schmidt *et al.* 2007). In 1990, Jarvis estimated that there were 400 million Domestic Cats worldwide (Schmidt *et al.* 2007).

3.3 Habitat

Small cats often have a similar habitat requirement. In Australia, the feral Domestic Cat provides a guide to the potential habitat requirements and use that might be expected for the Savannah Cat if released and established with feral Domestic Cat populations in Australia, although there is no available scientific literature to support this. This may be especially so given that the typical Savannah Cat if imported into Australia under current arrangements would be fifth generation or later and its genetic makeup would be expected to be 97 percent domestic cat. The feral Domestic Cat is highly adaptable and occurs in most habitats from the dry rangelands, into the wet/dry tropics and as far south as Macquarie Island where it was recently eradicated (DEH 2004). Savannah Cats are likely to tolerate a similar range of habitats.

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The availability of prey is one of the main deterministic factors which have been known to influence population densities and distribution of feral Domestic Cats (Harper 2007). Another key factor that has been known to influence the distribution of feral Domestic Cats is the availability of shelter which may be sourced for dens for birthing and as refuges from extreme environmental conditions (Koehler 1990; Johnson and Franklin 1991; Fernandez and Palomares 2000; Palomares 2001; Harper 2007).

Harper (2007) found that the home range size and density of feral Domestic Cats was inversely related. Male home range size has been found to be influenced by female distribution during the breeding season and by food abundance (Harper 2007). The male generally occupies a home range size of approximately ten square kilometers (depending on habitat). Larger cats may be expected to require a larger home range, especially when food is not abundant or is limited.

Feral Domestic Cats may shelter in trees, hollow logs, caves, crevices, abandoned burrows of other animals, and in dense vegetation.

3.4 Diet

Cats bred as companion animals may be fed a range of commercially available dry and wet food products formulated for cats i.e. Science diet, Whiskas, Advance. However, cats are adaptable and opportunistic hunters and even though fed on commercial products, may still take wild fauna if not adequately contained or controlled.

Olsen and Jensz (2007) commented that “*The cat family (Felidae) is considered to be the most highly developed of the present-day carnivores (Guggisberg 1975).*”

Cats are a highly predatory carnivore, with their dentition accentuating this. Cats are known to have canines and incisors which are emphasised for seizing and cutting, rather than molars for grinding as in the herbivores. Cats lack efficient processes for digesting plant materials.

In general, cats cannot produce their own Taurine (an essential organic acid), but rather rely on sourcing this acid from the flesh of other species they eat. For this reason, cats require large amounts of fresh animal protein to successfully survive and reproduce (Knopf *et al.* 1978).

In a study by Coman and Brunner (1972), they found the main diet of feral Domestic Cats (*Felis catus*) to consist of small mammals (mainly rabbits *Oryctolagus cuniculus*), small murids and phalangers (possums). Secondary components of feral Domestic Cat diets consisted of birds, reptiles, amphibians and invertebrates (Coman and Brunner 1972).

Feral Domestic Cats were also found to feed on carrion (decomposed meat) and household food scraps (Coman and Brunner 1972). Food scraps may include but not be restricted to bread, bacon rind and pieces of cooked meat (Coman and Brunner 1972).

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Coman and Brunner (1972) found that in undeveloped bushland areas, the diet of feral Domestic Cats consisted primarily of small indigenous mammals, whereas in suburban areas, the house mouse and rabbit were consumed more frequently.

The Savannah Cat would be expected to have similar dietary requirements in captivity as Domestic Cats. Should Savannah Cats escape and establish with feral Domestic Cat populations in Australia they would be expected to have similar dietary requirements to feral Domestic Cats. Should there be larger specimens resulting from Savannah Cat-feral Domestic Cat cross-breeding, these specimens may be able to prey on larger native fauna.

3.5 Social Behaviour and groupings

Cats are usually solitary animals, but can sometimes be found in pairs or larger groups (especially if they are related individuals) (Nowak 1991). They are predominantly nocturnal, but may be crepuscular (active between sunrise and sunset).

Feral Domestic Cats have been described as cryptic with a similar behavioural ecology to that which is observed in the larger cats (Liberg *et al.* 2000; Harper 2007). Harper (2007) commented that feral Domestic Cats tend to often be found in low densities.

Schmidt *et al.* (2007) and Liberg and Sandell (1988) suggested that feral Domestic Cats will convert to living in a socially large group in the presence of large amounts of concentrated and stable food sources.

Most female feral Domestic Cats will spend their life in the area in which they were born (Nowak 1991). In Victoria, females had home ranges of 0.7-2.7 square kilometers and males had home ranges of 3.3-9.9 square kilometers (Strahan 1995). Adult feral Domestic Cats live alone or in groups of up to 8 usually closely related individuals (Liberg 1980; Nowak 1991).

The temperament of hybrid cats varies with the parent stock, the number of generations they are removed from the initial wild species parental stock and the upbringing. For example, European Wild Cats and Leopard Cats have a reputation for being intractable in captivity, whereas Jungle Cats are more amenable. Hence, initial generations of hybrids from these species may take on those behavioural characteristics. However, they could equally take on the temperament of their Domestic Cat parent (Robinson 1977).

Breeders may select for breeding traits to enhance particular “favourable” characteristics. However, some breeders claim that the hybrids can be uncontrollable or temperamental, spraying urine and biting as their wild parents often do even when they are raised in captivity. This is particularly the case for hybrids where the backcrossing between the hybrid and Domestic Cat is only one or two generations, and the wild parent species has undesirable behavioural characteristics which are still prominent in the hybrid offspring (Baskin 2007 as cited in Olsen and Jensz 2007).

There is little scientific or other literature to inform understanding of the behaviour of Savannah Cats in domestic situations or in the wild should they escape or be released if imported into Australia. The behaviour and temperament would be dependent on

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characteristics sought by breeders initially. If Savannah Cats mix with feral Domestic Cats, they could be expected to have similar behaviours and temperaments to the feral Domestic Cat. However, there may be an additional risk that undesirable wildcat features (e.g. aggressiveness and hunting prowess) are enhanced by the remaining proportion of Serval genes entering the feral Domestic Cat population.

According to information from breeders however, it would be unlikely that companion Savannah Cats if kept in Australia and under control, would have the opportunity to interact with feral Domestic Cats.

4 Reproductive biology of Savannah Cats

There is little scientific or other literature to describe the reproductive biology of Savannah Cats. The majority of information is drawn from sources from hybrid cat breeders in the pet industry. Some information has been drawn from scientific literature on Domestic Cats and feral Domestic Cats. This section of the report discusses the issues and highlights uncertainties where they exist.

4.1 Age at maturity and lifespan of specimens

Longevity in cats is 15 years for most breeds (Krautheim 2007), but some individuals may live up to 25 years. However, longevity for cats is generally longer if kept in captivity than in the wild.

Female Domestic Cats reach sexual maturity at around 4-10 months, with males reaching sexual maturity at around 5-7 months of age. Both sexes can conceive around the time of sexual maturity. Servals reach maturity later, around 2 years of age.

4.2 Breeding frequency

The females of most cat species are polyestrous, meaning that they can come into heat many times over a year (NB: heat in cats refers to a period of oestrous). The heat period generally lasts for about 4 to 7 days if the female is bred, however if not bred, the period of heat can last longer (this allows greater chance of coming into contact with a male in the wild). In the wild, cats generally give birth once a year but can sometimes have two litters annually. This is dependent on environmental conditions such as weather and the availability and abundance of food sources. However, in captivity, cats can reproduce many times per year if allowed because resources such as food are not limited and temperature can remain quite constant.

Cats are also described as super-fecund. This means that a female cat may mate with more than one male while in heat, with her kittens coming from different fathers even though they may be in the same litter. There is no evidence to suggest sperm storage in female domestic cats over a longer period of time.

4.3 Mate choice

Sexual selection plays a large role in the selection by a female cat of a male which will father her offspring. Sexual selection will favour characteristics in males that improve their chances of fertilising the female (Knox *et al.* 2001). This also influences the female,

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who needs to ensure that her offspring will be provided with the strongest and most appealing genes.

In the case of Savannah Cats, if released into the wild, they may be favoured over smaller feral Domestic Cats. This could occur if they were of a larger size ensuring that they will win any competition with smaller males (also referred to as intrasexual selection).

Intrasexual selection will favour any trait that will increase a male's competitive ability (Knox *et al.* 2001). This characteristic would generally be passed to any offspring that resulted from the mating. Therefore Savannah Cat traits such as a larger size and temperament could be passed to offspring in a larger males' territory. This would increase the wild population of Savannah Cat genes if it was able to establish with a feral Domestic Cat population. It has also been suggested that size (intersexual selection) will initially influence female mate choice over any other trait (Knox *et al.* 2001).

There is a lack of scientific information to support speculation about mate choice in Savannah Cats in a non-captive context. Larger male Savannah Cats are likely to be favoured by selection. Depending on the size difference, the Savannah Cat may not readily mate with feral Domestic Cats. The acceptance of Savannah Cats to feral Domestic Cats may improve with each generation of back-crossing to Domestic Cats.

In regard to physical limitations, in general, the greater the size disparity between the parent stock species, the less likely it is that they will mate and raise their own young. This is because of physical constraints both to mating and to gestation. The length of the gestation period, which varies between species, is also an issue, however the closer the Savannah Cat is to a Domestic Cat, the less this would be an issue.

In early establishment of this hybrid, Serval males raised with Domestic Cat females will mate with them, although the pregnancy is not always successful. Human intervention may be necessary to raise the hybrid Savannah kittens, which are often born prematurely (i.e. after a normal Domestic Cat gestation of 63 days, rather than the 74 days of the Serval). The F₁ female Savannah Cats are fertile, but the male hybrids of the first three or four generations are usually infertile. Male hybrid fertility improves from F₅ generation onwards (Hartwell 2007).

Fertile hybrid males are obtained by back-crossing with either of the parent stock, until they are either more than about 90 percent Serval (but this type of hybrid is unusual) or more than 90 percent Domestic Cat (i.e., at least F₄).

4.4 Litter size

The gestation period for Domestic Cats is approximately 64-67 days (Tsutsui and Stabenfeldt 1993); for the Serval, the gestation period is 66-77 days (Krautheim 2007). The first litter is generally smaller than subsequent litters and litter size will generally average between 3 and 5 kittens (Krautheim 2007).

Domestic Cat kittens are usually weaned at around six to seven weeks and will become fully self-sufficient after this time. The highest knowledge growth occurs in the first 11

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weeks of a kitten's life and therefore most behaviour will be gleaned during this period (predominantly from the parents).

Not much is known about litter size of Savannah Cats other than limited information on the internet posted by interest groups and breeders.

4.5 Hybridisation

In a report by Olsen and Jenz (2007), they commented that "*Domestic Cats can interbreed with several species of small wild cat and sometimes produce fully fertile hybrids. Nevertheless, fertility problems are usual in early generation hybrids (Robinson 1977). Early generation hybrid males are rarely fertile, so that female F₁ are most often used for breeding (back-crossing with a Domestic Cat). Even so a high proportion of offspring from F₁ may be stillborn.*

Size and aggressiveness of the parent species are the main physical and behavioural constraints to the interbreeding of wild species and Domestic Cats. Behavioural limitations in early generation creation of hybrids include the lack of recognition by one or both species of the other as a potential mate. There have been claims by breeders that many Domestic Cats die in the early development of some of the new hybrid breeds, because the 'wild' species, such as a Jungle Cat and Geoffroy's Cat, will kill the Domestic Cat rather than mate with it (e.g., Baskin 2007). Contemporary breeders of hybrids avoid this by raising the wild cat male with Domestic Cats, prior to mating attempts so that it is more likely to recognise the female Domestic Cat as a potential mate rather than as a threat or prey."

As Savannah Cat are produced by crossbreeding Servals and Domestic Cats, then back-crossing with Domestic Cats, each generation of Savannah Cat is marked with a filial number e.g. F_(x). The following example is based on the assumption of breeding a Serval with a Domestic Cat and subsequent breeding only being with a Domestic Cat. For example, the cats produced directly from a Serval X Domestic Cat cross are the F₁ generation, and they are typically 50 percent serval. The F₂ generation, which has a Serval grandparent and is the offspring of the F₁ generation, is 25 percent Serval. The F₃ generation has a Serval great grandparent, and is 12.5 percent Serval. The F₄ would be 6.25 percent Serval and the F₅ would be about 3.13 percent Serval. However, if a F₁ Savannah Cat or a Serval is used as the parent in an F₂ cross, the percentage of Serval blood can jump to 75 percent. This principle would apply to any other generational cross, where the percentage can revert further towards the Serval. Claims of parentage and genetic make-up are difficult to substantiate in a context of ensuring compliance with a particular filial number (Hartwell 2007).

Being hybrids, Savannah Cats typically exhibit some characteristics of hybrid inviability. Because the male Savannah Cat is the heterozygous sex, they are most commonly affected, in accordance with Haldane's rule¹. Male Savannahs are typically sterile until the F₅ generation or so, although the females are fertile from the F₁ generation (Hartwell

¹ if one of the two sexes is missing, sterile, or rare in a population of first-generation hybrids between two different species, then that sex is the heterogametic sex (a male has two different sex chromosomes, such as XY as opposed to XX).

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2007). The male Savannah Cat kittens of the first three or four generations are mostly infertile and are often sold as companion cats in the United States of America and the United Kingdom. Other information available on the internet indicates that it is possible to backcross the hybrids repeatedly to a pure-blooded domestic or pure-blooded serval to get a fertile F₁ hybrid male; it is fertile because it is either more than 90% serval or more than 90% domestic. The Servals used are captive bred for the exotic pet market (Hartwell 2007).

The most obvious problem in breeding Servals with the Domestic Cat to produce the Savannah Cat is size difference. Typical domestic cats weigh between 3.6kg - 6.4kg with a few reaching 9.07kg. Servals are in the 13.6kg - 18.1kg range (Hartwell 2007). There may also be problems with gestation as indicated in 4.3 of this report.

5 Established populations in Australia or overseas and current status in Australia

The Savannah Cat is a new hybrid specimen of the Domestic Cat, developed in the United States of America in the mid-1980s. There are currently no known feral populations of the Savannah Cat in the world.

The Serval is not known to have established populations outside of its natural range (Long 2003).

Wild populations of the Domestic Cat are thought to have first established in Australia in the mid-17th century from Dutch ship-wrecks. The feral Domestic Cat had established throughout most of Australia by the late 1850s and today it is found in most habitats on the mainland of Australia, Tasmania and surrounding islands, excluding the wettest rainforests (DEH 2004; DEWHA 2004; Abbott 2002). It has also established widely across the world.

Having a long association with humans, and being highly adaptable, *F. catus* is found, and has established wild populations throughout the world (Long 2003). The species originated in temperate or hot, dry climates, and has been found in conditions of extreme cold and heat. It is more susceptible to cold, damp conditions than to cold alone (Wikipedia; Abbott 2002).

The risk of Savannah Cats establishing with feral Domestic Cat populations is discussed in section 7.2.

6 Other environmental risk assessments undertaken on the Savannah Cat both in Australia and overseas

On publication of this draft report, the only risk assessments relating to wild-cat species or hybrids derived from them was one undertaken to inform the Vertebrate Pests Committee (VPC) on the risk of the Fishing Cat (*Felis viverrina*).

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Bomford (2003) undertook an environmental risk assessment of the Domestic (feral) Cat. Issues from the Bomford report are covered in 7.2 of this report.

Biosecurity Queensland has advised DEWHA that an internal pest risk assessment of the Savannah Cat was in progress at the time of publication of this report. DEWHA understands that this risk assessment was being undertaken to inform Biosecurity Queensland on the potential pest risk and classification of the Savannah Cat under Queensland legislation.

No information was found in relation to other countries' risk assessments of the Savannah Cat.

7 Likelihood of the Savannah Cat establishing a breeding population in the Australian environment should it ever be released from effective human control

7.1 Likelihood of Escape

The keeping, including control of escape, of companion cats in Australia is the responsibility of individual owners. The degree that individuals take this responsibility seriously varies significantly.

Some breeders and individual owners present the case that the value (monetary or personal) of specimens may reduce the risk of escape or deliberate release. There is not always a correlation between the price of specimens and the level of secure housing provided by the owner or breeder. There is an issue of the monetary value of a specimen reducing after a period of time as numbers of specimens in captivity increase, and if the popularity of the specimen and interest in, or challenge of breeding, changes.

There is also a risk that, even if valuable, some owners may find that release is preferential to alternatives of on-selling (alternative ownership) or euthanasia if their situation changes and they find they cannot keep the specimen(s). This may also be the case if a specimen's temperament is undesirable and is not compatible to the needs of an owner.

Olsen and Jensz (2007) suggested that *Factors that can influence the likelihood of escape or release of cat hybrids include: the security of the premises holding the hybrids, including cages in homes; the keeping restrictions placed on hybrid cat owners; and community and keeper attitudes. Cats are hard to confine and readily escape and many members of the community feel that it is cruel to keep them confined in homes and cages, which can lead to willful or accidental release. Natural disasters and accidents can allow release even from the most secure cages. It is hard to control the keeping and breeding of cats and to detect breaches, and even harder to locate and remove the escapees. Hence, there is a high risk of escape or release.*

7.2 Likelihood of Establishment

In a report by Olsen and Jensz (2007), they commented that *Bomford (2003) assessed the Domestic Cat for its climate match to Australia, a primary determinant of the likelihood of successful establishment. It had the highest possible climate match, category 6, and its current distribution across the Australian continent and on many islands only adds weight to this assessment.*

Not all the potential parent species that could hybridise with the Domestic Cat would have a high climate match to Australia, and it is not possible to predict the climatic preferences of hybrids. However, given that the Domestic Cat has the highest match possible it seems likely that a fair degree of match might be expected for hybrids (such as the Savannah Cat).

Hybrid cats are likely to have the ability to live in human-disturbed environments (i.e. semi domesticated, which gives them opportunity to establish in the wild because they can find food and shelter amongst humans while they learn to fend for themselves, rather than be forced immediately into the wild).

While further hybridisation with feral Domestic Cats would lead to dilution of the Serval genes, certain characteristics of the Savannah Cat, would endow competitive advantage to the individual cat, ameliorating to some extent, the genetic dilution effect, such as size and athletic prowess that characterise Savannah Cats.

As the EPBC Act *Threat Abatement Plan for Predation by Feral Cats* states (Environment Australia 1999), it has been assumed that domestic and peri-urban cats will contribute and help bolster the populations of feral Domestic Cats. There is no quantitative evidence that this is the case for Domestic Cats or Savannah Cats, or that this would be a significant mechanism for maintaining feral Domestic Cat populations. Feral Domestic Cats have self sustaining populations and at present, there is no effective technique for wide-scale management of feral Domestic Cats so their populations fluctuate with climatic conditions and the availability of food.

Introduction of Savannah Cats into feral Domestic Cat populations may increase the prey range (including size of prey) sought by feral Domestic Cats that possess these characteristics. Should Savannah Cats interbreed with feral Domestic Cats, the characteristics could potentially be naturally selected in ensuing generations. However, as opportunistic hunters, Savannah Cats X feral Domestic Cats could take a wide range of available prey (e.g. a variety of prey sizes).

Feral Domestic Cats may have prolifically established across Australia due to the lack of natural predators. The only potential predators of adult cats within Australia are likely to be Dingoes, Domestic Dogs, Foxes, Snakes and large raptors such as Wedge-tail Eagles. Raptors would however, be generally more predatory on small kittens.

Feral Domestic Cats have been described as highly adaptable within the Australian environment (Wilson *et. al.* 1992). Wilson *et. al.* 1992 suggested that their distribution in Australia is limited by very few environmental factors, stating that feral Domestic Cats have the ability to survive and reproduce in all habitats and do not require drinking water (they obtain this from their prey).

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DEWHA has also run preliminary environmental risk assessments using Climate (BRS 2007) and the Bomford risk assessment models (Bomford 2006) in June 2008 (Appendix 4). The risk assessment approach is consistent with the approach endorsed by the Natural Resource Management Standing Committee under the *Guidelines for the Import, Movement and Keeping of Exotic Vertebrates in Australia* (2004). These are preliminary risk assessments that will be re-run following public comment on this report should new information become available. The preliminary risk assessment indicates, by assessing both a climate match of the Domestic Cat and Serval together, that the Savannah Cat poses a moderately dangerous risk to public safety (both captive and released individuals); an extreme pest risk, and that the Savannah Cat would have an extreme establishment risk. The establishment risk is particularly relevant given that feral Domestic Cats have rapidly and widely established across much of the Australian continent.

Under the Vertebrate Pests Committee's (VPC)² (2007) *List of Exotic Vertebrate Animals in Australia*, the Serval is considered as a serious pest threat. The earlier VPC category limited this species to statutory zoos or endorsed special collections. The Domestic Cat has also been listed on the *List of Exotic Vertebrate Animals in Australia*; in this case as an extreme pest threat. Earlier VPC categories viewed *Felis catus* as a widely kept species.

On 9 June 2008 the VPC discussed concerns raised by Queensland about the importation of Savannah Cats. Feedback from this meeting indicates a strong interest by states and territories in this issue.

DEWHA has also assessed the Serval's climate match to Australia in June 2008 and found it had the second highest match to the Australian climate, category 5, which is regarded in the Bomford model as a very high match. Within category 5, it was at the upper limits and was also only slightly lower than an extreme match. Results of the climate match are in Appendix 4.

The Savannah Cat's potential distribution should it be introduced is difficult to estimate because it is not a natural cat and has no natural geographic range. There is no scientific or other literature to inform whether or not Savannah Cats have established in the wild in countries where they have been bred or sold as companion cats. There is also no literature on how effective they are at establishing feral populations and no indication that they have ever established in the wild. The assumption in this assessment is that the Savannah Cat will share similar attributes as the Domestic Cat and feral Domestic Cat, including potential climate matches and establishment success.

As Savannah Cats have been derived from the Domestic Cat, they would appear to be well suited to the Australian environment.

^{2 2} Note: The Vertebrate Pests Committee (VPC) is an Australasian committee whose role is to provide coordinated policy and planning solutions to pest animal issues. VPC operates in accordance with Terms of Reference defined by the Natural Resources Management Standing Committee (NRMSC) and reports to it through the Natural Resources Planning and Policy Committee (NRPPC). Each state and territory, the Australian Government, New Zealand, CSIRO, and the Invasive Animals CRC have membership on the VPC

8 Assessment of the potential impact of the Savannah Cat should it establish feral population/s in Australia

Schmidt *et al.* (2007) commented that free-roaming cat populations in both urban and rural areas have well-documented problems associated with them. These include animal welfare concerns (starvation, disease, abuse), public health and nuisance concerns and impacts on native wildlife through predation, competition and disease transmission (Patronek 1998; Slater 2002; Schmidt *et al.* 2007). The assumption in this report is that should Savannah Cats establish with feral Domestic Cats, or free-roam in urban and rural areas, similar issues would arise.

Olsen and Jensz (2007) commented "*The cat family (Felidae) is considered to be the most highly developed of the present-day carnivores (Guggisberg 1975). Most of the potential parent lines for hybridisation with the Domestic Cat are within the size range of the Domestic Cat or larger and all have similar highly predatory lifestyles. Several of the potential parent species of wild cat are considered to be significant agricultural pests in their natural range and some have potential to seriously harm humans and their pets.*"

From information available generally across the internet, Savannah Cats weigh on average 5.6kg. Male Savannah Cats have been described as obtaining a weight up to 18kg, depending on generation. The larger size is almost twice that of the standard Domestic Cat. It is assumed in this report, that if this specimen was released into the wild, the potential impact of this specimen on the Australian environment would be at least equal to that of the feral Domestic Cat and the potentially larger sizes if interbreeding occurs, would impact on a different range of prey than that of feral Domestic Cats. The predation on native fauna by feral Domestic Cats in Australia has already been categorized as a key threatening process under the EPBC Act. Savannah Cats may contribute an additional genetic advantage to the current feral Domestic Cat population and pose further risk to native fauna.

Just as the feral Domestic Cat does, Savannah Cats could establish in fragmented and altered environments in addition to natural environments as they are likely to be highly adaptive in their behaviour, partly resulting from domestication, but also due to their genetic inheritance from the Serval.

The importation of Savannah Cats and a successful establishment with feral Domestic Cats may introduce enhanced hunting attributes into the feral Domestic Cat population, and may put at risk additional keystone species (Environment Australia 1999). While there is a risk that this could disrupt the dynamics of ecosystems over the long term, it could also be considered speculative to quantify this. A cautious view could be warranted in the absence of scientific or other literature to support an alternative conclusion.

8.1 Disease

It is unlikely that Savannah Cats would cause any greater risk than Domestic Cats and feral Domestic Cats (which are already in Australia) in terms of diseases likely to be introduced into Australia or through a greater risk of spread of diseases known to be in

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Australia. Quarantine protocols developed by Biosecurity Australia and the Australian Quarantine and Inspection Service (AQIS) would be the avenue to address this aspect beyond the current quarantine arrangements for Domestic Cats.

8.2 Similar niche species

Competitive interactions between Savannah Cats and native fauna would be greatest for species that are most ecologically similar to cats and those which overlap with cats in their diet, habitat, shelter or other resources.

One of the major detrimental impacts that the feral Domestic Cat has on native wildlife and ecosystems is a competitor to indigenous predators such as raptors, owls, nightjars and small carnivores (namely dasyurids) (George 1974; Liberg 1984; Dickman 1996). Savannah Cats could contribute to this impact.

There is also likely to be a risk of displacement of native fauna through competition for habitat or shelter, but in relation to the Savannah Cat, no specific information is available. The Savannah Cat would most likely share similar niches e.g. nesting, shelter etc, and territorial behaviours with feral Domestic Cats should they be introduced into the feral Domestic Cat population.

In a 2007 report by Olsen and Jensz, they commented that “*The Domestic (Feral) Cat is considered to be one of Australia’s worst environmental pests and a major threat to several threatened fauna species, particularly on islands (Wilson et al 1992; Environment Australia 1999; Clarke et al 2001; Bomford and Hart 2002). Its main impact is by predation on native animals but it may also compete with carnivorous marsupials (Dickman 1996). The cat’s semi-arboreal habit extends its impact beyond that of similar solely ground-dwelling predators (Ebenhard 1988). Cats can also spread disease, such as toxoplasmosis and sarcosporidiosis, to wildlife (AFFA 2001). Hybrid cats with a greater size and predatory potential than the Domestic Cat could expose an even greater size range of native animals to their predation (Biró et al 2005).*”

8.3 Probable prey/food sources

Paton (1994) found that in total the consumption of native prey by feral Domestic Cats comprises 48 species of mammals, 177 species of birds, 46 species of reptiles, 5 species of amphibians and many invertebrate species. This range of preyed species may increase if the Savannah Cat integrated into the feral Domestic Cat population due to its size and hunting ability.

As urban development encroaches on Australia and the amount of vegetation decreases, the rate of predation on the native wildlife by feral Domestic Cats may also increase (Dickman 1996). Savannah Cats in a feral Domestic Cat population would in these situations contribute to the detrimental impact on populations of native species.

Paton (1993) also suggested that an average feral Domestic Cat weighing 4kg may require 300g or more of animal flesh per day to survive. He equated this to be equivalent to 10 small indigenous animals daily, 70 per week or 3,600 native animals per year per

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cat. Paton (1993) described a conservative estimate of small native animals killed by feral Domestic Cats to be about 1000 individuals per year. It is well known in the literature that feral Domestic Cats will prey on the most accessible food available (Errington 1936; McMurry and Sperry 1941; Parmalee 1953; Eberhard 1954; Coman and Brunner 1972).

If Savannah Cats establish in an area where immigration of native species is limited or cannot occur, their impact on native fauna could add pressure to local populations but this would depend on the species involved and their range of other pressures that they are subject to. Dickman (1996) suggested that where cats are found, many native species populations can only be maintained where continuous immigration from surrounding areas occurs. This finding on cats is supported generally in the literature by Errington (1936), McMurry and Sperry (1941), Parmalee (1953), Eberhard (1954) and Coman and Brunner (1972). Further studies would be needed to confirm the Savannah Cat's potential to have a greater consumption need, or that it would have a greater impact on native specimens. Such studies could not occur without a feral population. The degree that feral Domestic Cats contribute to pressures on native species is not certain: there may be other factors involved.

Without control over the secure keeping of cats e.g. cat runs, house-based cats may still obtain from 15 to 90 percent of their food from natural prey (Liberg 1984). Liberg (1984) found that prey choice of feral Domestic Cats was similar to that of house-based cats albeit feral Domestic Cat diets subsisted almost completely on natural prey. Liberg (1984) also found that feral Domestic Cats consumed four times the amount of prey as opposed to an average house-based cat. If the Savannah Cat was established in the feral Domestic Cat population, similar consumption patterns would be likely.

Cats have been described as ambush hunters, stalking their prey, lying in wait and then pouncing on the prey in a swift movement (Nowak 1991). The Serval has additionally been described as having a prey kill-rate of 49 percent (Hunter 2006) where standard Domestic Cats have a kill-rate of 10 percent. The Serval's hunting characteristics could enhance the hunting skills of a feral Domestic Cat population, although this proposition is not addressed in available scientific or other literature.

In conclusion, the Savannah Cat could be expected to have a similar prey and food sources as feral Domestic Cats and there could be a potential for Savannah Cats to prey on a broader range of fauna because of their hunting ability and potential to be a larger sized hunter.

8.4 *Habitat and local environmental conditions*

The feral Domestic Cat is a habitat generalist and can utilize most habitats within the Australian environment. The Savannah Cat is also likely to be capable of adapting to the Australian environment should it escape or be released.

9 Types of activity that the Savannah Cat may be used for if imported into Australia

Websites promote the Savannah Cat as a novel companion cat with characteristics of a wild cat, primarily with features that make them look similar to a Serval. They promote that Savannah Cats for sale will either be desexed, or sold intact to registered cat breeders for an additional charge.

Several cat breeders in Australia (in Queensland, Victoria and South Australia) have publicised their intention to import Savannah Cats for commercial breeding and sale to the public. Information on websites and provided to the Department indicate selective breeding of F₅ Savannah Cats to retain desirable temperament of the Domestic Cat and desirable features of the Serval.

Importations are likely to be for parent stock for an Australasian breeding program. Interstate trade and export of offspring produced is a likely outcome.

Website information suggests that the Savannah Cat will be a defined market. Initially it is unlikely to be a commonly traded companion animal because of the high price of specimens (advertised as \$5000). It is unlikely that specimens will be used for other than commercial purposes or as companion pet animals.

10 Guidelines on the way in which Savannah Cats should be kept, transported and disposed of if imported into Australia

If imported into Australia, Savannah Cats could be kept by breeders, pet shops and private individuals.

Other than guidelines through the pet trade industry, by veterinary associations, cat associations, and the RSPCA, and some local councils, there is no effective control. Savannah Cats will be kept in private residences and as a consequence there are no ways to control when and where they will be kept, unless the local council has measures such as cat curfews.

An American breeder of the Savannah Cat recommends that potential owners consider constructing an indoor/outdoor facility to suit the owner and the pet, including perimeter fences around the enclosure (Hummel 2007). This is also advised by some councils within Australian states. A further example of attempts to control Domestic Cats and their interaction with feral Domestic Cats and native wildlife is given in the ACT. Where people keep Domestic Cats in dwellings in the new Gungahlin suburbs of Forde and Bonner, they must have secure cat housing (i.e. cat runs) due to their proximity to Mulligan's Flat and other soon to be declared nature reserves.

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The extent to which these conditions or guidelines can be enforced is debatable. Despite best intentions, if Savannah Cats are imported and kept in Australia, it can be expected that some may escape from time to time.

The Natural Resource Management Standing Committee endorsed *Guidelines for the Import, Movement and Keeping of Exotic Vertebrates in Australia* in May 2004. The guidelines outline an approach within the context of Australian Government, state and territory legislation to minimise the risks posed by the introduction, keeping and movement of exotic vertebrates. The adopted approach to managing exotic vertebrates is based on the principles for vertebrate pest management now accepted across Australian jurisdictions. The guidelines highlight risk management and provide guidance on security measures appropriate for the management and keeping of exotic vertebrates.

10.1 Transportation and Quarantine

Importation of Savannah Cats is subject to quarantine and veterinary procedures as required by AQIS during pre export isolation and post arrival quarantine. Specimens are likely to be shipped to Australia and transported, by air transport in containers consistent with requirement 73 of the International Air Transport Association (IATA) live animal regulations (IATA 2004) and under requirements of AQIS.

Transportation containers for cats must be of specific construction, animals must be sufficiently prepared prior to dispatch, feeding and drinking must be considered, as should be the guidelines for general care and loading.

Australian quarantine protocols are managed under the *Quarantine Act 1908* by AQIS. The period of quarantine on arrival in Australia is dependent on the country of origin. Depending on when vaccinations occur, cats must spend between 30 and 115 days in quarantine. In the case of proposed imports where the country of origin is the USA, a 30 day quarantine period in Australia is normally required.

11 Commonwealth, State and Territory legislative controls on the Savannah Cat or specimens from which it originated

While an EPBC Act live import permit is required to import a Serval, Savannah Cats that have been bred to fifth generation removed (F₅) from a Serval are currently treated as Domestic Cats. Under the current live import listing of the Domestic Cat, F₅ Savannah Cats can be imported, subject only to quarantine control by AQIS under the *Quarantine Act 1908*. This live import approach is based on a CITES resolution (Appendix 3) on animal hybrids for the purpose of protecting CITES listed species.

The Serval is listed as a species threatened by international trade under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). It is listed on Part 2 of the live import list which means it can be imported with a permit. The listing contains the restriction 'Eligible non-commercial purpose only, excluding household pets'.

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As mentioned, after lawful importation, the keeping of exotic animals is generally a matter for the relevant state or territory authorities.

State, territory and local governments are supporting initiatives aimed at encouraging responsible pet ownership and control of pest species. This includes developing appropriate legislation, education and awareness programs, and management plans to address local problems with domestic and stray cats and measures to address feral Domestic Cats. Victoria has enacted the *Domestic (Feral and Nuisance) Animals Act 1994* which requires cat owners to register their animals and gives councils the power to set fees and take remedial action when landowners experience problems with wandering cats. New South Wales has initiated the development of legislation to promote responsible ownership and improved welfare of companion animals.

The predation by feral Domestic Cats on native wildlife is listed as a key threatening process under the EPBC Act. Under the EPBC Act, the Australian Government in consultation with the states and territories has developed the *Threat Abatement Plan for Predation by Feral Cats* (Environment Australia 1999).

The threat abatement plan aims to reduce the impact of feral Domestic Cats on native wildlife by:

- implementing feral Domestic Cat control programs in identified regions of high conservation priority
- encouraging the development and application of innovative, humane feral Domestic Cat control methods
- collecting and disseminating information to improve our understanding of the ecology of feral Domestic Cats in Australia, their impacts and humane methods to control them
- educating land managers and others about feral Domestic Cat impacts to ensure their skilled and effective participation in control activities.

Significant Australian Government, state and territory government investment has occurred for the control of feral Domestic Cats under the Australian Pest Animal Strategy (NRMSC 2007). The strategy highlights the importance of preventing new introductions into Australia as the primary and most cost-effective way to manage potentially invasive species given the high costs of monitoring, control and eradication of unwanted alien specimens.

12 Conditions or restrictions that could be applied to the import of the Savannah Cat to reduce any potential for negative environmental impacts

Options to limit the potential impact of the Savannah Cat on the Australian environment include: preventing import into Australia; or if import is permitted, establishing conditions that would minimise any risk of escape from effective captivity or minimise the likelihood of deliberate release.

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The *Guidelines for the Import, Movement and Keeping of Exotic Vertebrates in Australia* (NRMSC 2004) suggest minimum security measures to mitigate associated environmental risks for various threat categories of pest species. Under the VPC's *List of Exotic Vertebrate Animals in Australia* (July 2007) Servals are a serious threat species and Domestic Cats are an extreme threat species. The Savannah Cat is not included in this list but would most likely be treated in a similar manner.

An extreme threat specimen under these guidelines would be required to be contained within high security facilities (Appendix 6) and holders of these specimens are recommended to be members of the Australasian Regional Association of Zoological Parks and Aquaria or equivalent professional bodies. The guidelines also limit the breeding of such species or specimens to those that are CITES listed. It also suggests that extreme risk species be held in single sex colonies, with an appropriate distance between colonies. The number of animals held in each collection would be limited.

In the case of the Domestic Cat, it is acknowledged as a widely kept specimen and despite its extreme risk, there are no national or state/territory controls to restrict these specimens other than some recent examples in areas where there is a high conservation incentive or public concern.

In the case of Savannah Cats which are not yet in Australia, a cost effective option is to prohibit import. Alternative controls over those keeping them would be difficult to apply uniformly across Australia given the range of state and territory, and local government legislation.

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13 Appendix 1



Australian Government

Department of the Environment, Water, Heritage and the Arts

Terms of Reference

EPBC Act Part 13A environmental assessment of the suitability of the import of Domestic Cat x Serval hybrid specimens (Savannah Cat) into Australia

1. Provide information on the taxonomy of the original species used in the hybrid cross.
2. Provide information on the status of the specimens under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). For example, is the specimen listed on CITES Appendix I, II or III, and if so, are there any specific restrictions on the movement of these specimens?
3. Provide information about the ecology of the specimens including but not restricted to
 - the natural geographic range
 - habitat
 - what it eats
 - social behaviour and groupings
4. Provide information on the reproductive biology of the specimens, including
 - the age at maturity (first breeding) and lifespan of the specimens
 - how frequently breeding occurs
 - if the female can store sperm
 - how many live-born young are produced at each breeding event
 - if the specimen has hybridised with other species (both in the wild and in captivity) or has been a product of hybridisation itself and possible back-crosses.
 - if the hybrid progeny are fertile
5. Provide information on whether this specimen or species from which it has originated is in Australia and whether it has established populations in Australia or overseas, and if so, where those populations are.
6. Provide information on, and the results of, any other environmental risk assessments undertaken on the specimens both in Australia and overseas, including any Import Risk Analyses undertaken by Biosecurity Australia.
7. Assess the likelihood that the specimens could establish a breeding population in the Australian environment should it ever be released from effective human control.
8. Provide a comprehensive assessment of the potential impact of the specimen should it establish feral population/s in Australia including but not restricting to the impact of this specimen on:
 - similar niche species (i.e. competition with other species for food, shelter etc.)
 - probable prey/food sources

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- habitat and local environmental conditions.
9. Provide a summary of the types of activity that the specimens may be used for if imported into Australia (e.g. pet, commercial, scientific).
 10. Provide detailed guidelines on the way in which specimens should be kept, transported and disposed of in accordance with the proposed activity with the types of activity that the species may be used for if imported into Australia.
 11. Provide information on all Commonwealth, State and Territory legislative controls on the specimens or specimens from which it originated including the specimens' current quarantine status, or pest or noxious status, or whether it is prohibited or controlled by permit or licence in any state or territory.
 12. What conditions or restrictions, if any, could be applied to the import of the specimens to reduce any potential for negative environmental impacts (e.g. single sex imports)

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14 Appendix 2

Table 1: List of known Domestic Cat-wildcat hybrids. The Domestic Cat is currently on Part 1 of the *List of Specimens Taken to be Suitable for Live Import* * denotes claims of hybrids that are yet to be confirmed.

Taxon on live import list	Common Name	Current status of <i>Felis catus</i> in Australia	Hybrids Known	Hybrid Cross
<i>Felis catus</i>	Domestic Cat	Commercial pet, feral populations across all of Australia	Punjabi	domestic cat X Indian Wild cat (<i>F. lybica</i>)
			unnamed	domestic cat X Scottish Wild cat (<i>F. silvestris</i>)
			unnamed	domestic cat X African Wild cat (<i>F. lybica</i>)
			Chausis, Jungle Curl, Stone Cougar	domestic cat X Jungle cat (<i>F. chaus</i>)
			unnamed	domestic cat X Black-footed cat (<i>F. nigripes</i>)
			Bengal, Pantherette	domestic cat X Leopard cat (<i>P. bengalensis Amur subspecies</i>)
			Ussuri	domestic cat X Leopard cat (<i>P. bengalensis</i>)
			unnamed	domestic cat X Rusty-spotted cat (<i>P. rubiginosus</i>)
			Machbagraal, Viverral	domestic cat X Fishing cat (<i>P. viverrinus</i>)
			Safari	domestic cat X Geoffroy's cat (<i>L. geoffroyii</i>)
			Bristol	domestic cat X Margay (<i>L. wiedii</i>)
			unnamed	domestic cat X Oncilla (little spotted cat, tiger cat) (<i>L. tigrinus</i>)
			Savannah	domestic cat X Serval (<i>F. serval</i>)
			unnamed	domestic cat X Caracal (<i>C. caracal</i>)
			Legend Cat, American Lynx, Desert Lynx, Alpine Lynx, Highland Lynx, American Bobtail and Pixie-bob	domestic cat X Bobcat (<i>L. rufus</i>)
			Jaguarundi Curl*, Mandalan Jaguar*	domestic cat X Jaguarundi (<i>P. yagouarundi</i>)*
			unnamed*	domestic cat X Pallas cat (<i>F. manul</i>)*
unnamed*	domestic cat X North American Lynx (<i>L. canadensis</i>)*			

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Table 2: List of wild cat taxa listed on Part 2 of the *List of Specimens taken to be Suitable for Live Import* (the live import list)

Taxa	Common Name	CITES Appendix	Current status of wild form in Australia	Hybrids Known
<i>Acinonyx jubatus</i>	Cheetah	I	Maintained in Zoos, high security facilities	
<i>Catopuma temminckii</i>	Asiatic Golden Cat	I	Maintained in Zoos, high security facilities	
<i>Caracal caracal</i>	Caracal	I	Maintained in Zoos, high security facilities	
<i>Felis manul</i>	Pallas cat	II	Maintained in Zoos, high security facilities	Claimed to have hybrid- but unconfirmed
<i>Felis serval</i>	Serval	II	Maintained in Zoos, high security facilities	Savannah cat- not currently in Australia, but pending import. Bengal hybrid can be crossed with these specimens.
<i>Felis viverrina</i>	Fishing Cat	II	Maintained in Zoos, high security facilities	Machbagraal, Viverral- not currently in Australia. Bengal hybrid can be crossed with these specimens.
<i>Leopardus pardalis</i>	Ocelot	I	Maintained in Zoos, high security facilities	
<i>Neofelis nebulosa</i>	Clouded Leopard	I	Maintained in Zoos, high security facilities	
<i>Panthera leo</i>	Lion	II	Maintained in Zoos (high security facilities) &/or circus'	
<i>Panthera onca</i>	Jaguar	I	Maintained in Zoos, high security facilities	
<i>Panthera pardus</i>	Leopard	I	Maintained in Zoos, high security facilities	
<i>Panthera tigris</i>	Tiger, Sumatran Tiger	I	Maintained in Zoos (high security facilities) &/or circus'	

15 Appendix 3

CITES hybrid definition

Conf. 10.17 (Rev. CoP14)*

Animal hybrids

RECALLING Resolution Conf. 2.13 on the problem of hybrids, adopted by the Conference of the Parties at its second meeting (San José, 1979);

CONCERNED that trade in hybrids of species included in the Appendices should be controlled in order to support the controls on trade in the species included in Appendices I and II;

THE CONFERENCE OF THE PARTIES TO THE CONVENTION

DECIDES that:

- a) hybrid animals that have in their recent lineage one or more specimens of species included in Appendix I or II shall be subject to the provisions of the Convention just as if they were full species, even if the hybrid concerned is not specifically included in the Appendices;
- b) if at least one of the animals in the recent lineage is of a species included in Appendix I, the hybrids shall be treated as specimens of species included in Appendix I (and shall be eligible for the exemptions of Article VII when applicable);
- c) if at least one of the animals in the recent lineage is of a species included in Appendix II, and there are no specimens of an Appendix-I species in such lineage, the hybrids shall be treated as specimens of species included in Appendix II; and
- d) as a guideline, the words "recent lineage", as used in this Resolution, shall generally be interpreted to refer to the previous four generations of the lineage;

RECOMMENDS that, when Parties are considering the making of non-detriment findings, in accordance with Article III, paragraph 2 (a), or Article IV, paragraph 2 (a), for specimens of hybrids that are subject to the provisions of the Convention, they take into account any potential detriment to the survival of the listed species; and

REPEALS Resolution Conf. 2.13 (San José, 1979) – Problem of Hybrids.

16 Appendix 4

16.1 Table 1 Risk assessment based on Bomford (2003) risk assessment parameters for terrestrial birds and mammals NB: This is a draft and the risk assessment will be rerun after receipt of public comments and will take any new information available into account.



Australian Government

Department of the Environment, Water, Heritage and the Arts

Note: Because the Savannah Cat is not a natural species, the Serval and Domestic Cat have been jointly used to assess its risk. These two species are those in which the Savannah Cat has been derived.

Species identification and sources

Common name	Savannah Cat
Scientific name	<i>Felis catus X Felis serval</i>
Date assessed	16-Jun-08
Literature Search Type And Date:	JSTOR, google scholar, google, scientific journal databases

Risks to public safety

A1. Risk to people from individual escapees (0–2)	1	Servals kept as pets have been known to attack unprovoked, causing serious injuries that require hospitalization. Domestic cats can cause unprovoked attacks, especially if cornered or handled, and may require medical treatment, especially if in the wild.
A2. Risk to public safety from individual captive animals (0–2)	0	No risk from products obtained from cats i.e. cats have no toxins
Stage A. Risk posed by captive or released individuals = Sum of A 1 to 2. (0–4)	1	Moderately dangerous

Establishment

B1. Degree of climate match between species overseas range and Australia (1–6)	6	Extreme climate match in Australia for Domestic Cats, Severe for Servals, presumed extreme for Savannah Cats as approx. 97% Domestic Cat
B2. Exotic population established overseas (0–4)	4	No records of Servals establishing outside of Africa, however feral Domestic Cats are widespread in many countries
B3. Taxonomic Class (0–1)	1	Mammal
B4. Non-migratory behaviour (0–1)	0	Servals are non migratory in their native range. Domestic Cats do not migrate great distances. Migration would only occur in the wild if lack of prey was available in an area
B5. Diet (0–1)	1	Generalist diet includes a variety of lizards, frogs, small birds, insects, fish, small mammals, domestic poultry, rabbits

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B6. Lives in disturbed habitat (0–1)	1	Servals and domestic cats adapt very well to agricultural environments and domestic cats can live in a wide range of disturbed habitats
B7. Overseas range size (0–2)	2	Introduced range for Domestic Cats quite large, covering several continents. Servals are restricted to Central and lower African regions
	15	Extreme

Likelihood of becoming a pest

C1. Taxonomic group (0–4)	2	Carnivora
C2. Overseas range size including current and past 300 years, natural and introduced range (0–2)	2	See B7
C3. Diet and feeding (0–3)	3	Mammal that is a strict carnivore and arboreal
C4. Competition with native fauna for tree hollows (0–2)	2	Can use hollow trees for shelter of young
C5. Overseas environmental pest status (0–3)	3	Feral cats are severe agricultural pest in many countries and are considered feral species.
C6. Climate match to areas with susceptible native species or communities (0–5)	5	Servals have more than 20 10% climate match (closest match) grid squares, and/or more than 100 grid squares within a 30% climate match, that overlap the distribution of any susceptible native species or communities. Feral Domestic Cats already overlap mos
C7. Overseas primary production pest status (0–3)	3	Servals will take poultry, as will domestic cats
C8. Climate match to susceptible primary production (0–5) Hint: Use the "commodity" sheet created when a CLIMATCH grid is opened.	5	Feral Domestic Cats established over most of Australia, which coincides with all the primary production in Australia
C9. Spread disease (1–2)	2	All mammals are rated 2
C10. Harm to property (0–3)	0	Neither Serval or domestic Cat can affect roads, fences or buildings
C11. Harm to people (0–5)	2	Injuries or harm moderate but unlikely to be fatal, and few people at risk (see A1)
C. Probability an exotic species would become a pest (for birds, mammals, reptiles and amphibians) = Sum of C 1 to 11. (1–37)	29	Extreme

Summary

A. Risk to public safety posed by captive or released individuals	1	Moderately dangerous
B. Risk of establishing a wild population	15	Extreme
C. Risk of becoming a pest following establishment	29	Extreme

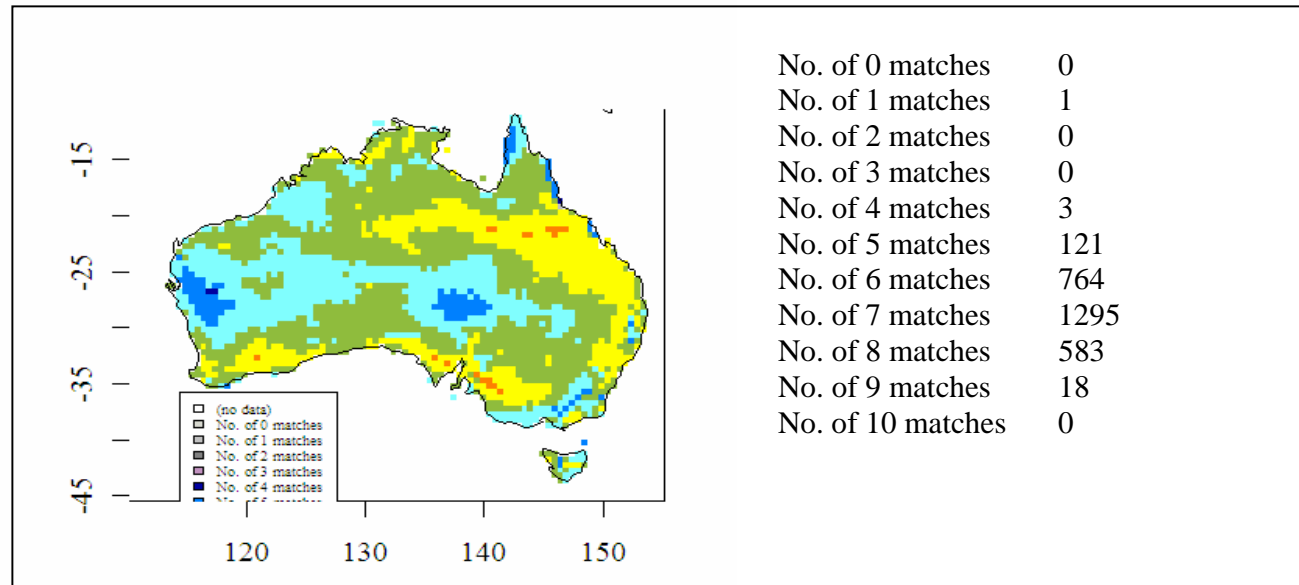
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16.2 Climate matches

Table: Feral Domestic Cat climate match to Australia (Taken from Bomford (2003)).

Species	Climate match class (number of grid cells)					Climate Match Index ⁶	Climate Match Score ⁶
	10%	20%	30%	40%	50%		
Feral cat <i>Felis catus</i> ⁴	41	319	758	629	638	6399	6

⁴ Input data for world distribution of feral cats was based on a literature search conducted by David Forsyth (Department of Natural Resources and Environment, Victoria, pers. comm., 2001). This probably underestimates the actual overseas range and hence climate match of cats.



Map: Climate match of the Serval (*Felis serval*) to the Australian environment (Prepared by Department of the Environment, Water, Heritage and the Arts 2008).

NB: Orange colouration indicates a 9 match (90%); yellow indicates a 8 (80%) match; green 70% match; light blue indicates 60% match; medium blue indicates a 50% match; dark blue indicates a 40% match.

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17 Appendix 5

The table below has been extracted from the *Guidelines for the Import, Movement and Keeping of Exotic Vertebrates in Australia* (2004), which was prepared by the VPC under the Natural Resource Management Standing Committee (NRMSC). This table explains the minimum level of security required under these guidelines for extreme or serious threat species.

Table 3. Examples of the minimum level of security measures appropriate for risk management for the import and keeping of exotic vertebrates.

Risk Management Option	Extreme	Serious	Moderate	Low
High security facility approved by the relevant State or Territory authority for keeping a particular extreme threat species.	✓			
Serious threat species kept for:		✓		
i. public display and education purposes approved by the relevant State or Territory authority, and/or				
ii. genuine scientific research approved by the relevant State or Territory authority.				
Species will be restricted to collections registered by the relevant State or Territory authority for keeping serious or moderate threat species.		✓	✓	
Nil Import	✓			
Single sex (including non-pregnant females) or sterilised animals	✓			
Limit No < 20 (population management plan)	✓	✓		
Population management plan with max no.	✓	✓	✓	
High Security Facility	✓	✓	✓	
Authorised handling restrictions / Appropriate expertise	✓	✓	✓	
Bio-climatic site restrictions	✓	✓		
Contingency Plans for Escapes	✓	✓	✓	
Restriction on proximity to suitable habitat	✓	✓	✓	
Notification of trade under permit between States	✓	✓	✓	
Individuals micro-chipped	✓	✓		
Demonstrate Long term viability – Contingency Plan for trade of animals	✓	✓		
Proprietors and key personnel to have no relevant criminal convictions	✓	✓	✓	
Bonds	✓	✓		
Record Keeping	✓	✓	✓	
Meet Animal Welfare Requirements (NB This is not a VPC restriction but would be required by other legislation)	✓	✓	✓	
Notification of movement of animals between facilities	✓	✓	✓	