PEST RISK ASSESSMENT

Common Marmoset

Callithrix jacchus

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Department of Primary Industries, Parks, Water and Environment
Resource Management and Conservation Division

Tasmania
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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 the use within the Department.

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1. Summary

Common Marmosets (*Callithrix jacchus*) are small, Old World monkeys that are native to northeast Brazil. The species has established outside its native range following introduction into the Brazilian states of Bahia, Espirito Santo, Parana, Rio de Janeiro, Santo Catarina, Sao Paulo and Sergipe; and Buenos Aires in Argentina. No major impacts of establishment have been noted.

Common Marmosets are unlikely to establish in Tasmania. Climate modelling indicates that Tasmania has a highly dissimilar climate which would not readily support this species.

Common Marmosets are listed as 'Least Concern' under the IUCN Red List. The species is relatively widely distributed, adaptable, and occurs in a number of protected areas. Common Marmosets are commonly used in biomedical research in Europe and the United States of America.

As primates, Common Marmosets are listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The trade of this species is controlled under this convention.

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

In Tasmania, Common Marmosets are 'controlled animals' under the Tasmanian *Nature Conservation Act 2002*.

The species is classed as an 'extreme' threat under the Vertebrate Pest Committee's list of exotic animals. The assessment notes that the species is kept in some private zoos and approval has been given for breeding according to breeding management plans.

This risk assessment concludes that Common Marmosets (*Callithrix jacchus*) are a moderate threat to Tasmania and recommends that imports be restricted to those license holders approved for keeping moderate threat species.

2. Introduction

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2.1 NAME AND TAXONOMY

Kingdom: Animalia

Phylum: Chordata

Class: Mammalia

Order: Primates

Family: Callitrichidae

Genus: *Callithrix*

Species: *C. jacchus*

Sub-species or variety (if applicable): None known.

Common names (including any industry or trade names): Common Marmoset, White-tufted-ear Marmoset, Cotton-eared Marmoset.

Known hybrids: Common Marmosets (*Callithrix jacchus*) may hybridise with the Black-tufted Marmoset (*C. penicillata*) (Sales *et al.* 2010).

Close relatives: Close relatives include the five other members of the *Callithrix* genus, Pygmy Marmoset (*Cebuella pygmaea*) and Goeldi's monkey (*Callimico goeldii*).

2.2 DESCRIPTION

Common Marmosets are Old World monkeys with small bodies. Adults typically weigh between 350-450g and there is no significant dimorphism between the sexes (Abbott *et al.* 2003). Head and body length is 215mm and tail length is 295mm (approximate) (Long 2003).

The fur on the body is a grizzled yellow-grey with grey bands. The tail is ringed with black and grey and the ears have prominent white tufts which distinguish this species (Long 2003). A white patch of fur is prominent on the forehead. Skin on the face is pale and darkens with exposure to sun (WPRC 2010). Infants are born with a brown-yellow coat and develop white ear tufts and white forehead markings as they age (WPRC 2010). Older individuals show greying of the fur around the head and face (Abbott *et al.* 2003).

Seasonal variation in appearance has not been noted. Similarly there are no noted morphs of this species and no noted description of hybrids.

2.3 CONSERVATION AND LEGAL STATUS

CONSERVATION STATUS

Common Marmosets are listed as 'Least Concern' under the IUCN Red List. The species is relatively widely distributed, adaptable, and occurs in a number of protected areas. The current rate of decline is not sufficient for Common Marmosets to qualify for a threatened category (Rylands *et al*. 2008). Human-induced habitat loss and degradation is a noted threat for this species (WPRC 2010), and there is some hunting for pets (Rylands *et al*. 2008). Common marmosets are highly desirable as pets and there have been numerous thefts from zoos in Australia.

The species is commonly used in biomedical research. The Common Marmoset is the most frequently used primate in European research laboratories (Scott 1994, cited in Abbott *et al*. 2003), and is being increasingly used for research in the United States of America. Laboratory animals are not usually sourced from the wild but are sourced from established captive breeding programs (Abbott *et al*. 2003).

LEGAL STATUS

As primates, Common Marmosets are listed under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The trade of this species is controlled under this convention.

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

The species is classed as an 'extreme' threat under the Vertebrate Pest Committee's list of exotic animals. The assessment notes that the species is kept in some private zoos and approval has been given for breeding according to breeding management plans (Vertebrate Pest Committee 2007).

In Tasmania, Common Marmosets are 'controlled animals' under the Tasmanian *Nature Conservation Act 2002*.

3. Biology and Ecology

3.1 LIFE HISTORY

Males and females reach sexual maturity by approximately 15 months of age (Abbott and Hearn 1978). Gestation typically lasts about 5 months and females usually give birth to dizygotic twins, although triplets and single young are possible (WPRC 2010). In the wild, Common Marmosets show two birth peaks in September-November and April-June to coincide with food availability (Stevenson and Rylands 1998 cited in WPRC 2010).

Females can become pregnant within 10 days of giving birth and can give birth to 3-5 offspring per year. Young typically weigh about 25g at birth and are carried on the backs of their mothers until they are capable of independent locomotion (usually at 1 month of age). Young are weaned when they are about 3 months old (Abbott *et al.* 2003).

Sperm storage and reproductive senescence is not noted in this species.

Common Marmosets (*Callithrix jacchus*) may hybridise with the Black-tufted Marmoset (*C. penicillata*) (Sales *et al.* 2010). Progeny are thought to be fertile.

3.2 HABITAT REQUIREMENTS AND PREFERENCES

Of the Callitrichidae family, Common Marmosets occupy the most arid and changeable habitat (Rylands *et al.* 1993 cited in Abbott *et al.* 2003). Suitable habitat includes coastal forest, dry semideciduous inland forest, riverine forest in dry thorn scrub and savannah forest (Rylands and de Faria 1993, Rylands *et al.* 1996; cited in WPRC 2010). Average temperatures in this area ranges from 19˚C to 26˚C, and rainfall is highly variable (WPRC, 2010). Altitude is typically 0-1000m above sea level.

Common Marmosets are arboreal and forage in the understory and middle layers of forests. Vegetation is essential as a food source and for protection against predators. Common Marmosets move through trees in a similar way to squirrels and may run across branches and leap between trees (WPRC 2010).

This species is not noted for occupying tree hollows.

3.3 NATURAL GEOGRAPHIC RANGE

Common Marmosets are found only in north-eastern Brazil in South America (Figure 1). The species is found in the Brazilian states of Alagoas, Pernambuco, Paraíba, Rio Grande do Norte, Ceará, Piauí, Maranhão, Bahia, and possibly north-eastern Tocantins (Rylands *et al.* 2008). The natural range of the species is estimated at 1.56 million km^2.

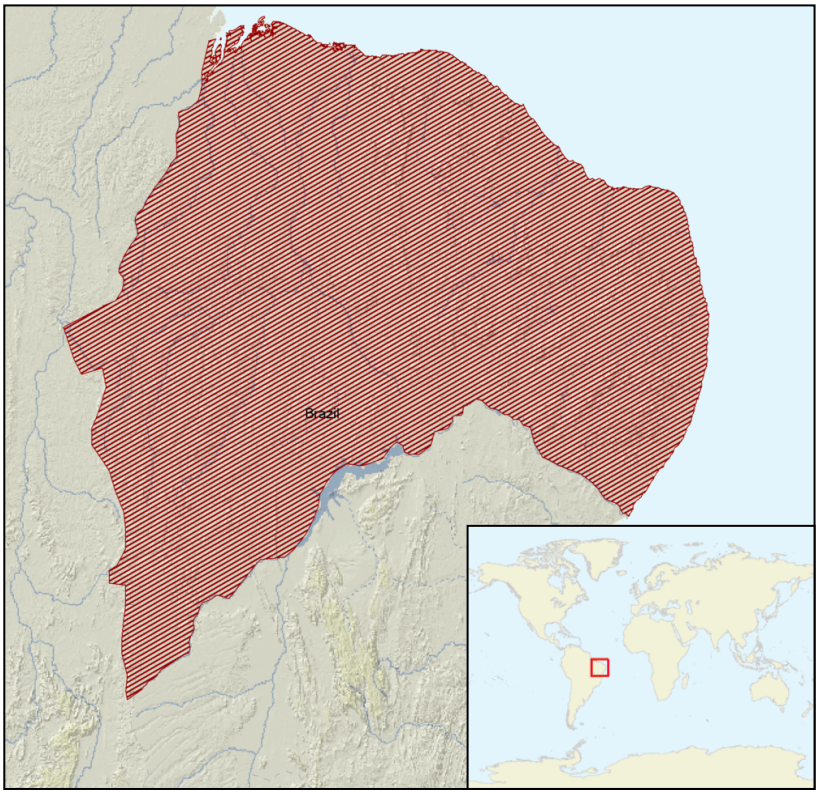

Figure 1. Natural range of the Common Marmoset (*Callithrix jacchus*) in Brazil (from Rylands *et al.* 2008).

3.4 INTRODUCED GEOGRAPHIC RANGE

Common Marmosets have been introduced into the Brazilian states of Bahia, Espirito Santo, Parana, Rio de Janeiro, Santo Catarina, Sao Paulo and Sergipe. The species is also reported to have established in Buenos Aires in Argentina (Rylands *et al.* 2008). Limited detail is available of the range of Common Marmosets within these states, although total introduced range is likely to be less than 1 million km^2. Most introductions are thought to be deliberate releases, although the destruction of habitat may contribute to the dispersal and increased range of this species.

3.5 POTENTIAL DISTRIBUTION IN TASMANIA

Using modelling applications by the Bureau of Rural Science (DAFF), climate is compared between the species' current distribution in South America and its potential Australian distribution (shown in Figure 2). Modelling indicates that northern and eastern Australia has areas of similar climate which may support the establishment of introduced populations. Tasmania shows a dissimilar climate, although eastern Tasmania shows a more similar match than western Tasmania (highest match score: 4).

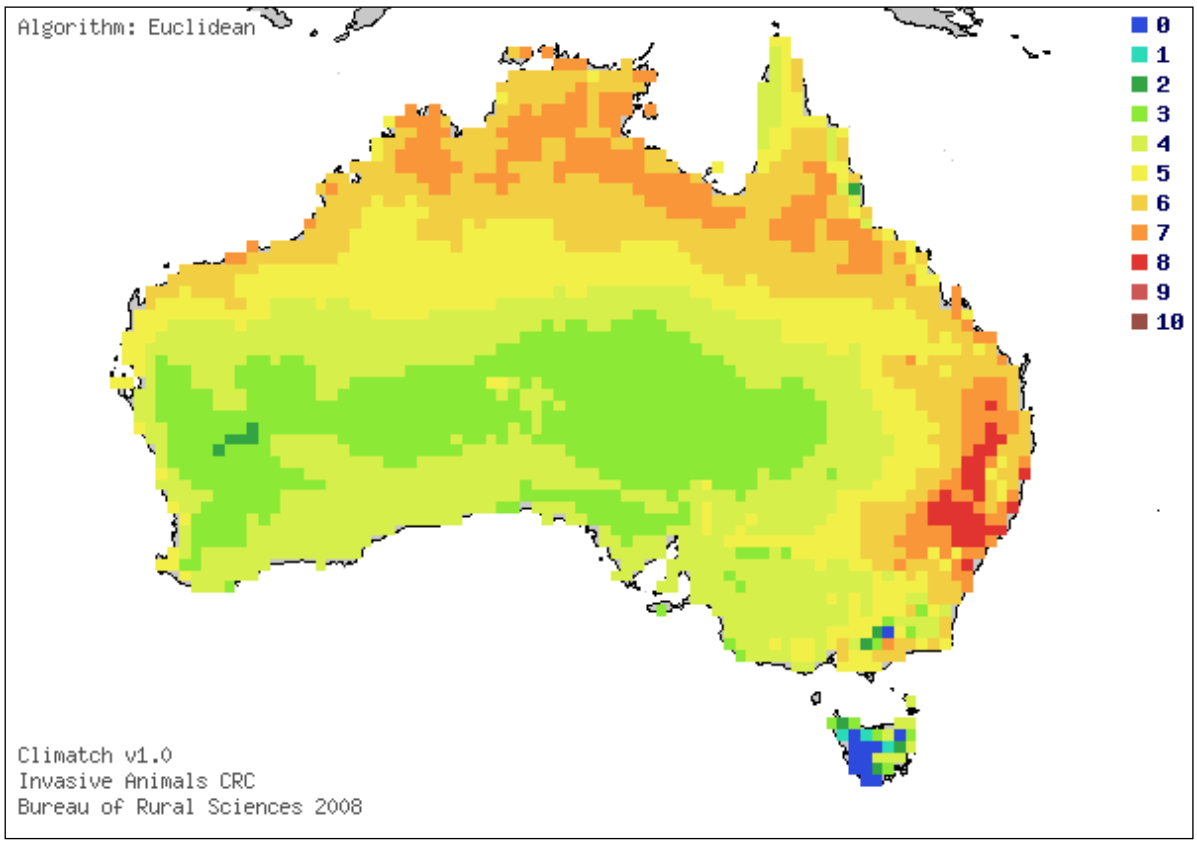

Figure 2. Climate comparison between the natural range of *C. jacchus* and Australia, where 10 is a 'perfect' match and 0 is having a very dissimilar climate. Tasmania has a climate match score of 0 - 4. (Distribution source: Long 2003; Rylands *et al.* 2008).

3.6 DIET AND FEEDING BEHAVIOUR

Common Marmosets are specialist omnivores, feeding mainly on tree exudates (gum, sap, latex and resin) and insects. Plant exudates form a significant component of the diet. This resource is available throughout the year and provides a stable resource when other food items are scarce. Common Marmosets obtain exudates by using their lower incisors to gnaw the bark of plants and stimulate the flow of exudates, which are then licked or scooped out with their teeth (Stevenson and Rylands 1988 cited in WPRC 2010). Marmosets may revisit previously gouged holes to obtain exudates. The home range of this species is determined by the density of suitable trees and varies from 0.005 to 0.065km^2 (Scanlon *et al.* cited in WPRC 2010).

Insects are another important protein source for this species and they spend approximately 30% of their time foraging for insects (Digby and Barreto 1998 cited in WPRC 2010). Other supplementary food items include fruits, seeds, flowers, fungi, nectar, snails, lizards, frogs, bird eggs, nestling and small infant mammals (Stevenson and Rylands 1988, and Digby and Barreto 1998 cited in WPRC 2010).

There is limited potential for this species to feed on agricultural plants. Any impact is unlikely to be significant.

3.7 SOCIAL BEHAVIOUR AND GROUPINGS

Common Marmosets form groups ranging from 3 – 15 individuals (Stevenson and Rylands 1988 cited in WPRC 2010). Groups feed and sleep together and assist in the raising of young. Captive and free-living Common Marmosets exhibit cooperative breeding. Usually only a single dominant male and female breed, and all group members contribute in rearing the infants of the dominant pair (Abbott *et al*. 2003).

Groups of Common Marmosets maintain territories and display hostile behaviour towards neighbouring groups. As plant exudant is an abundant and non-seasonal resource, Common Marmosets can exist in extremely high population densities of as much as eight animals per hectare (Ferari and Lopes Ferrari 1989, cited in WPRC, 2010).

3.8 NATURAL PREDATORS AND DISEASE

In their natural range, predators of Common Marmosets include mustelids (weasels), felids (cats), snakes and birds of prey. In Tasmania, potential predators include the Tasmanian Devil (*Sarcophilus harrisii*), Spotted-tailed Quoll (*Dasyurus maculatus*), large raptors such as the Wedge-tailed Eagle (*Aquila audax fleayi*) and, should it become established, the introduced European Red Fox (*Vulpes vulpes*).

The *Callithrix* genus is vulnerable to a range of diseases including rabies viruses, yellow fever virus and tuberculosis (Pavlin *et al*. 2009). For further information on diseases in this species, refer to Ludlage and Mansfield (2003).

3.9 THREAT TO HUMAN SAFETY

Common Marmosets are not considered a direct threat to human safety and the species is not noted for injuring or attacking humans. Individuals have the potential to bite, causing moderate injury which may require medical attention, but serious injury is unlikely.

Unlike other primates such as Asian Macaques, this species is not an agent for Herpes B (Abbott *et al*. 2003).

3.10 HISTORY AS A PEST

Common Marmosets are known to inhabit plantations of cacao, bananas and coconuts, and may occupy orchards and gardens (Wolfheim 1983, cited in Long 2003). No control of this species has been carried out and the dietary preferences of this species suggest that Common Marmosets are

unlikely to be a major pest to agriculture. No significant pest impacts or damage to the environment and agriculture have been noted.

3.11 POTENTIAL IMPACT IN TASMANIA

Common Marmosets are likely to compete with Tasmanian possum species for fruits and small invertebrates. Possums which would compete for these resources include the Common Brushtail Possum (*Trichosurus vulpecula*), Common Ringtail Possum (*Pseudocheirus peregrinus*), Eastern Pygmy Possum (*Cercartetus nanus*) and Little Pygmy Possum (*Cercartetus lepidus*) (Strahan 1995).

Other species which may experience some competition with the Common Marmoset include the Eastern Quoll (*Dasyurus viverrinus*), Southern Brown Bandicoot (*Isoodon obesulus*) and Eastern Barred Bandicoot (*Perameles gunnii*). These three species are largely insectivorous, but the Eastern Quoll also opportunistically eats fruit and small vertebrates (Bryant & Squires 2009; Menkhorst & Knight 2001).

Although climate modelling shows Tasmania's climate to be unsuitable for the Common Marmoset, should populations establish in Tasmania, feeding on fruit could impact on the orchard industry. Studies have shown that *Eucalyptus* species are not suitable for Common Marmosets (Vanselow *et al.* 2011), and the timber industry in therefore unlikely to be impacted.

4. Risk Assessment

4.1 PREVIOUS RISK ASSESSMENTS

The Common Marmoset has been assessed as an 'extreme' threat by the Vertebrate Pest Committee (VPC, 2007). No other formal risk assessments for this species have been noted.

4.2 RISK ASSESSMENT

The following risk assessment determines the risk of Common Marmoset to Tasmania using the Bomford model (2008) and proposes assigned threat categories and import classifications for the species.

Species:	**Common Marmoset (*Callithrix jacchus*)**	
Date of Assessment:	August 2011	
Literature search type and date:	See references	
Factor	**Score**	
A1. Risk posed from individual escapees (0-2)	1	*Animal that can make unprovoked attacks causing moderate injury (requiring medical attention) or severe discomfort but is highly unlikely (few if any records) to cause serious injury (requiring hospitalisation) if unprovoked.* Common Marmosets may potentially cause injury by biting but unprovoked attacks are unlikely.
A2. Risk to public safety from individual captive animals (0-2)	0	*Nil or low risk (highly unlikely or not possible).* Risk arising from irresponsible use of product 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 = 1	**Public Safety Risk Ranking** A ≥ 2, Highly Dangerous A = 1, Moderately Dangerous A = 0, Not Dangerous = Moderately Dangerous
B1. Climate match score (1-6)	1	*Very low.* No climate match.
B2. Exotic population established overseas score (0-4)	4	*Exotic populations established on a continent.* Introduced populations have established in the Brazilian states of Bahia, Espirito Santo, Parana, Rio de Janeiro, Santo Catarina, Sao Paulo and Sergipe, and Buenos Aires in Argentina.

B3. Overseas range size score (0-2)	1	*1-70 million km².*
B4. Taxonomic class score (0-1)	1	*Mammal.*
Stage B. Likelihood of establishment (risk that a particular species will establish a wild population in Tasmania)	**Establishment Risk Score** = B1 + B2 + B3 + B4 = 7	**Establishment Risk Ranking** B = 11-13, Extreme B = 9-10, High B = 6-8, Moderate B ≤ 5, Low = Moderate
C1. Taxonomic group (0-4)	0	*No taxonomic matches.*
C2. Overseas range size (0-2)	0	*Range less than 10 million km².*
C3. Diet and feeding (0-3)	1	*Mammal that is not a strict carnivore.*
C4. Competition for native fauna for tree hollows (0-2)	0	*Does not use tree hollows.*
C5. Overseas environmental pest status (0-3)	0	*Never reported as an environmental pest in any country or region.*
C6. Climate match to areas with susceptible native species or communities (0-5)	0	*No grid squares within the highest six climate match classes.*
C7. Overseas primary production (0-3)	0	*No reports of damage to crops or other primary production in any country or region.*
C8. Climate match to susceptible primary production (0-5)	1	*Commodity damage score: 5.*
C9. Spread disease (1-2)	2	*Mammal.*
C10. Harm to property (0-3)	0	*<$100,000 per year.*
C11. Harm to people (0-5)	2	*Injuries or harm or annoyance likely to be minor and few people exposed.*
Stage C. Consequence of Establishment (risk that an established population would cause harm)	**Consequence Risk Score** = sum of C1 to C11 = 6	**Consequence Risk Ranking** C > 19, Extreme C = 15-19, High C = 9-14, Moderate C < 9, Low = Low
ASSIGNED THREAT CATEGORY:	**MODERATE**	
PROPOSED IMPORT CLASSIFICATION:	**IMPORT RESTRICTED TO THOSE LICENSE HOLDERS APPROVED FOR KEEPING MODERATE THREAT SPECIES**	

5. Risk Management

This risk assessment concludes that Common Marmosets (*Callithrix jacchus*) are a moderate threat to Tasmania and that imports be restricted to those license holders approved for keeping moderate threat species. On the basis of this risk assessment, it is recommended that Common Marmosets be placed on the list of imports permitted with conditions.

As defined under the *Policy and Procedures for the Import, Movement and Keeping of Vertebrate Wildlife in Tasmania* (DPIPWE 2011), the following mandatory conditions will apply to the import and keeping of this species. Additional requirements will be implemented.

1. The animal must not be released, or be allowed to escape from effective control.
2. Specimens seized or forfeited as a result of illegal or accidental introductions, where rehousing is not available, will be humanely euthanized.
3. Animal welfare requirements under the *Animal Welfare Act 1993* and any approved Code of Practice or Management Plan must be met.
4. Import only permitted by holders approved to keep the species under a wildlife exhibition licence. The licence will specify a number of conditions.
5. Individuals to be micro-chipped or otherwise identified, or treated to allow identification.
6. Facility must meet minimum standards for welfare and security.
7. Facility must be available for inspection at any reasonable time.
8. Audits of facilities and collections.
9. The maximum number of individuals of a species held at the facility to be stipulated on the licence, taking into account relevant factors. Gender may also be stipulated.
10. Written approval prior to movement of animals between facilities and trade of species under licence.
11. Record keeping and reporting to DPIPWE as required by DPIPWE.
12. Collections containing species subject to approval by DPIPWE as meeting best practice for keeping the species concerned.

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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**	NA		
Timber (includes native and plantation forests)	**10**	NA		
Aquaculture	**6**	NA		
Sheep (includes wool and meat)	**5**	NA		
Vegetables	**5**	NA		
Fruit (includes wine grapes)	**5**	1	1	5
Poultry (including eggs)	**1.5**	NA		
Cereal grain (includes wheat, barley, sorghum etc)	**1**	NA		
Other crops and horticulture (includes nuts and flowers)	**1**	NA		
Pigs	**1**	NA		
Bees (includes honey, beeswax, and pollination)	**0.5**	NA		
Oilseeds (includes canola, sunflower etc)	**0.5**	NA		
Grain legumes (includes soybeans)	**0.3**	NA		
Other livestock (includes goats and deer)	**0.3**	NA		
Total Commodity Damage Score (TCDS)				5

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	Moderate	Import restricted to those license holders approved for keeping moderate threat species
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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