

# PEST RISK ASSESSMENT

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## Tammar Wallaby

*Macropus eugenii*



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**About this Pest Risk Assessment**

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

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# I. Summary

The Tammar Wallaby (*Macropus eugenii*) is a small nocturnal macropod that was originally common throughout coastal scrub, sclerophyll forests, heath and mallee ecosystems of southwestern Western Australia and southern South Australia and several offshore islands in the region. The wallaby is a herbivore, feeding primarily on grass, however it will also feed on a variety of herbs, shrubs and small trees. The mainland population has substantially declined since the 1890s due to habitat clearing, hunting, fire, predation by foxes and cats, and competition with rabbits.

Tammar Wallabies have been introduced onto three islands in South Australia (Boston Island near Port Lincoln, Greenly Island, and Victor Island). The species was also introduced to Kawau Island, New Zealand in about 1870, and Tammar Wallabies have also established populations at Rotorua in New Zealand. Genetic analysis suggests that the population on the North Island of New Zealand originated from animals from Kawau Island.

The species is listed as 'least concern' under the IUCN Red List. In Tasmania, Tammar Wallabies are 'controlled animals' under the Tasmanian *Nature Conservation Act 2002*.

Tammar Wallabies are regarded as an environmental and agricultural pest on Kangaroo Island and in New Zealand. On Kangaroo Island 20,000 to 40,000 wallabies are culled each year to protect crops. If the species established in Tasmania it is likely to impact on agriculture and compete with native species of wallabies.

There is a high likelihood of this species establishing in Tasmania, with potentially extreme consequences.

This risk assessment concludes that Tammar Wallabies are an extreme threat to Tasmania and recommends that imports be prohibited.

## 2. Introduction

### 2.1 NAME AND TAXONOMY

<b>Kingdom:</b>	Animalia
<b>Phylum:</b>	Chordata
<b>Class:</b>	Mammalia
<b>Infraclass:</b>	Marsupialia
<b>Order:</b>	Diprotodontia
<b>Family:</b>	Macropodidae
<b>Genus:</b>	<i>Macropus</i>
<b>Species:</b>	<i>M. eugenii</i>



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**Sub-species or variety (if applicable):** There are three sub-species of Tammar Wallaby:

- *M. eugenii derbianus* (native to south-western Western Australia and five offshore islands);
- *M. eugenii decres* (native to Kangaroo Island, South Australia); and
- *M. eugenii eugenii* (native to mainland South Australia).

A fourth sub-species, *M. eugenii flindersi*, native to Flinders Island, South Australia, has been extinct since the 1960's (Poole *et al.* 1991).

**Common names (including any industry or trade names):** Tammar Wallaby, Dama Wallaby (South Australian sub-species), Scrub Wallaby.

**Known hybrids:** A Tammar Wallaby (*M. eugenii*) male crossed with a Black Striped Wallaby (*M. dorsalis*) produced a sterile male hybrid (Smith *et al.* 1979). The hybrid was bred in captivity. There are no known hybrids in the wild.

**Close relatives:** There are seven other species in the subgenus *Notamacropus* including, *M. irma* (Western Brush Wallaby), *M. greyi* (Toolache Wallaby), *M. parma* (Parma Wallaby), *M. dorsalis* (Black-striped Wallaby), *M. agilis* (Agile Wallaby), *M. rufogriseus* (Red-necked Wallaby), and *M. parry* (Whiptail Wallaby).

### 2.2 DESCRIPTION

Wallabies of the genus *Macropus* are generally smaller than kangaroos and wallaroos. The Tammar Wallaby is one of the smallest species of *Macropus* (Nowak 1999). Male Tammar Wallabies are larger than females. The average length of males is 643mm, with a tail length of 411mm. Females are on average 586mm in the body, with a tail length of 379mm. On average males weigh 4.6kg and females weigh 3.7kg (DEC 2002).

The upper body is greyish-brown, becoming rufous on the sides of the body and limbs, especially in males. Tammar Wallabies often have reddish shoulders and are pale grey or white underneath.

There is no dorsal stripe and the tail is grey with a black tip and shorter than other wallabies' tails. The nose is naked and there is no distinct facial stripe (Long 2003).

## 2.3 CONSERVATION AND LEGAL STATUS

### CONSERVATION STATUS

The assessment by the IUCN in 2008 classified Tammar Wallabies (*M. eugenii*) as 'Least Concern' (Morris *et al.* 2008). In 1996 the IUCN listed the three sub-species separately, classifying two sub-species (*M. eugenii derbianus* and *M. eugenii decres*) as 'Lower Risk/Near Threatened'. The sub-species native to the mainland of South Australia, *M. eugenii eugenii*, was listed as 'extinct in the wild'.

*M. eugenii eugenii* is listed as 'Extinct in the Wild' under the *Environment Protection and Biodiversity Conservation Act 1999*. Genetic analysis has indicated that the sub-species is present as feral populations on Kawau Island and near Rotorua, New Zealand (Taylor and Cooper 1999). The animals were released on Kawau Island by the former Governor for the Colony of South Australia in the 1840s (DENR 2011). Since 2003 the South Australian government has conducted a conservation program to re-introduce the South Australian mainland sub-species of Tammar Wallaby from the New Zealand population. In January 2011 there were an estimated 80 Tammar Wallabies in Innes National Park, on the southern Yorke Peninsula (DENR 2011).

The Kangaroo Island sub-species (*M. eugenii decres*) is locally abundant (Poole *et al.* 1991). The Western Australian sub-species (*M. eugenii derbianus*) is not listed (Priority 5)<sup>1</sup> under the *Wildlife Conservation Act 1950* (WA).

### LEGAL STATUS

Tammar Wallabies are not listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Under the *Environment Protection and Biodiversity Conservation Act 1999*, *Macropus eugenii eugenii* are listed as 'specimens taken to be suitable for live import' and a permit under the Act is required to import the sub-species.

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

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<sup>1</sup> Priority 5 taxa are Conservation Dependent. These species are not listed as threatened but are subject to a specific conservation program, the cessation of which is likely to result in the species becoming threatened within five years.

# 3. Biology and Ecology

## 3.1 LIFE HISTORY

The Kangaroo Island sub-species (*M. eugenii decres*) is one of the most well-studied macropod species (Hinds *et al.* 1990). The breeding cycle is strictly seasonal and influenced by light availability (Berger 1966). Females normally produce one pouch young a year which are born between late January and March. Tammar Wallabies exhibit embryonic diapause, where the embryo does not immediately implant in the uterus following fertilisation but is maintained in a state of dormancy. The female will mate just after giving birth, however the development of the new embryo is inhibited by lactation of the pouch young (lactational quiescence) and the by short day length once the young has left the pouch. The embryos are reactivated in mid-December and the young enter the pouch approximately 40 days later (twelve months after mating occurred). The young are suckled in the pouch for eight to nine months and leave the pouch between September and November.

More than 90 per cent of females carry pouch young by the end of the breeding season, however mortality amongst juveniles is high during their first summer, reaching up to 40 per cent (DEC 2002). Females become mature at around nine months, while still suckling, and males do not become mature until they are eighteen months to two years old. On Kangaroo Island males can live to at least 11 years and females to 14 years (Smith and Hinds 1995).

## 3.2 HABITAT REQUIREMENTS AND PREFERENCES

Tammar Wallabies shelter in dense low vegetation during daylight and move to open grassy areas to feed after dark. They inhabit coastal scrub, heath, dry sclerophyll forest, and thickets in mallee and woodland (Smith and Hinds 1995).

Population density of Tammar Wallabies on Kangaroo Island (*M. eugenii decres*) is approximately 0.46 individuals per hectare in near-optimum habitat, i.e. foraging habitat comprising of cleared land with grass cover, surrounded by forest and woodland with a relatively dense understory for shelter (DEH 2004). On Western Australian offshore islands the population density of *M. eugenii derbianus* ranges from 0.62 – 1.11 individuals per hectare (DEH 2004).

This species does not occupying tree hollows.

## 3.3 NATURAL GEOGRAPHIC RANGE

Determining the natural geographic range of the Tammar Wallaby is complicated because the range was substantially reduced through habitat clearing, hunting, fire, predation by foxes and cats, and competition with rabbits before the populations were well studied. In 1924, it was reported that the time when a 'good first-hand account of the small scrub wallabies of South Australia' had gone by due to the 'remarkable disappearance' of the mainland wallabies (Wood Jones 1968). Wood

Jones reported that 'only a few years ago [the Tammar Wallaby] swarmed in scrub-covered districts all over the State'. He indicated that some still persisted in the southern end of the Eyre Peninsula and in the south-eastern districts of South Australia, but those populations were not well studied. The best available information has been used for the Tammar Wallaby historic distribution, however there is some uncertainty surrounding this aspect of the risk assessment because of the substantial population decline that occurred before adequate records were made.

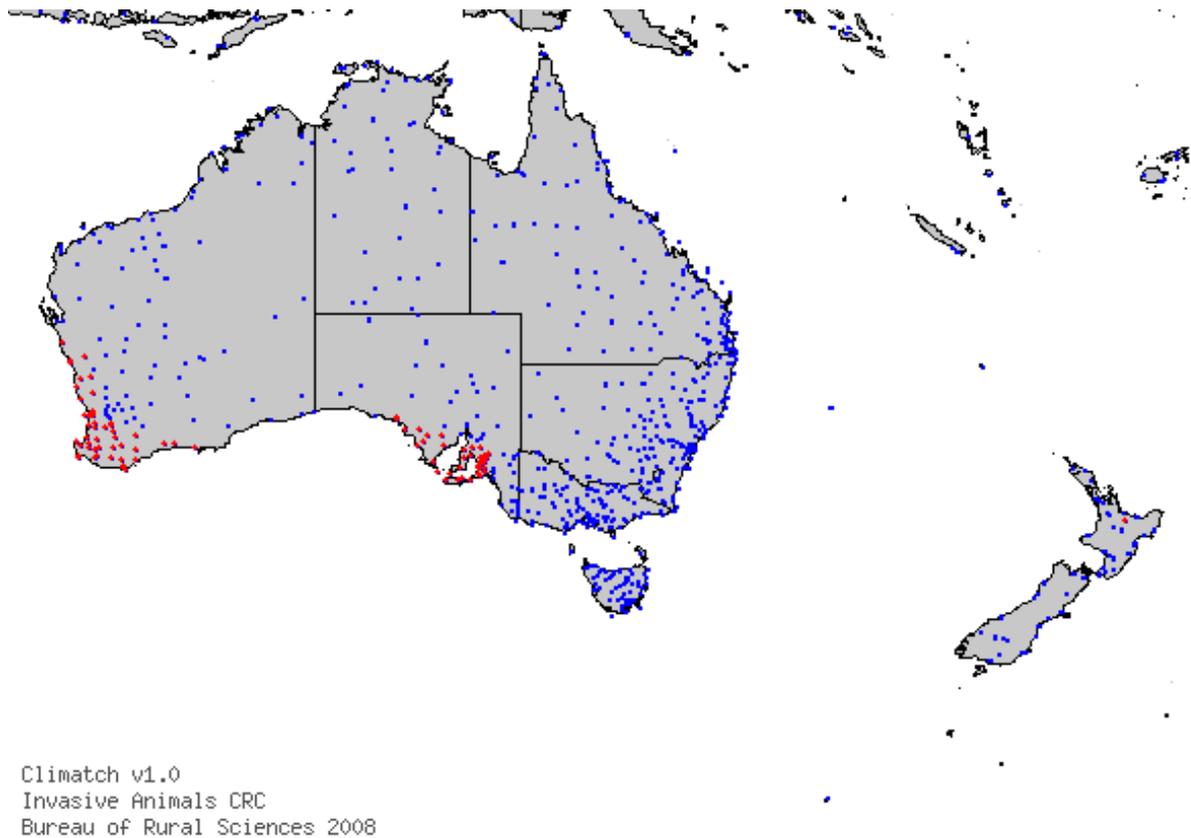
The Western Australian sub-species (*M. eugenii derbianus*) was distributed along the Western Australian coast from the Kalbarri National Park (north of Geraldton) to Cape Arid, and inland to the Wheatbelt (DEC 2002, Long 2003, Poole *et al.* 1991). The wallabies have also been recorded on islands in the Recherche Archipelago, Houtman Abrolhos Group and Garden Island (DEC 2002, Long 2003).

The South Australian sub-species (*M. eugenii eugenii*) once occurred on the Yorke Peninsula, Eyre Peninsula, the Mid North region, the Adelaide Plains and from the Fleurieu Peninsula to the Murray River (DEH 2004, Poole *et al.* 1991).

There are also several islands in South Australia on which Tammar Wallabies are endemic including Kangaroo Island (*M. eugenii decres*). A distinct sub-species were also formally present on Flinders Island (*M. eugenii flindersi*) (DEH 2004, Wood Jones 1968).

### 3.4 INTRODUCED GEOGRAPHIC RANGE

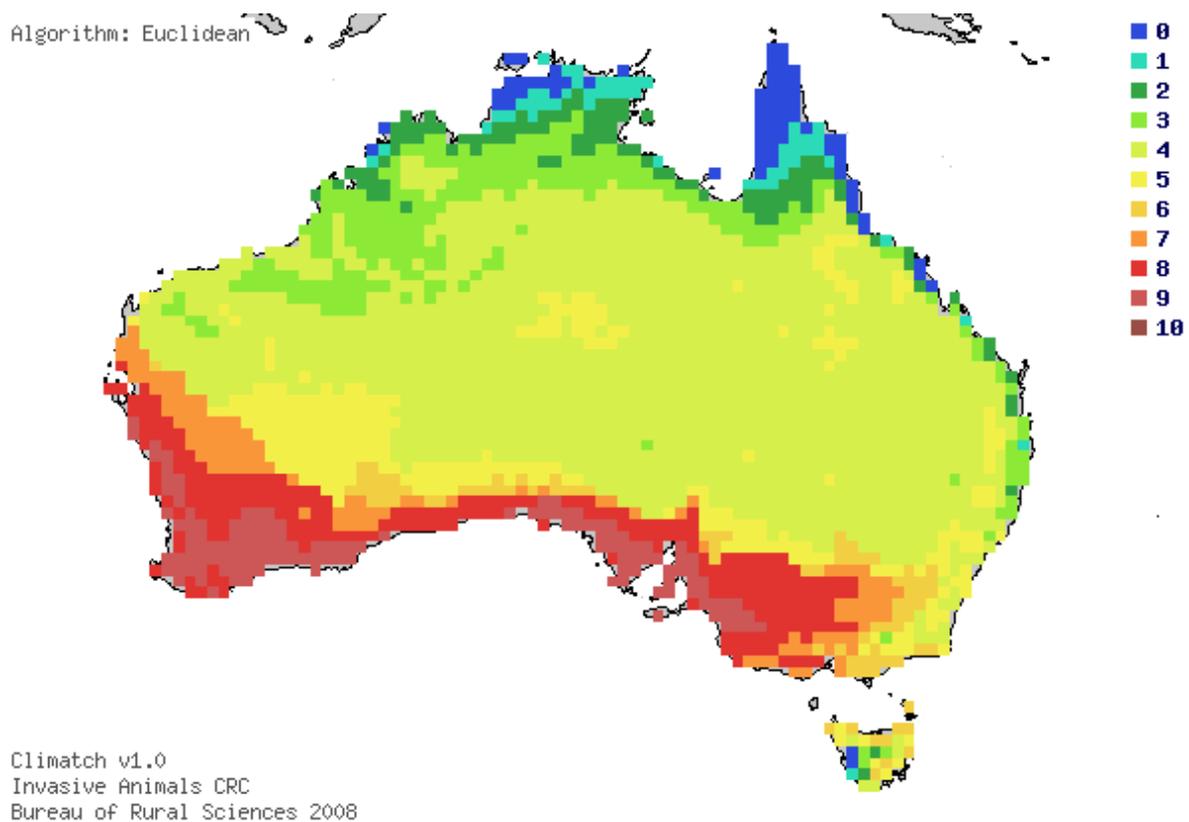
Early settlers released Tammar Wallabies on a number of offshore islands to provide a food supply for castaways. More recently, Tammar Wallabies have been released for tourism onto some Australian offshore islands. Tammar Wallabies have been introduced onto three islands in South Australia (Boston Island near Port Lincoln, Greenly Island, and Victor Island). Skulls have also been found on Reevesby and North Gambier islands. It is not known whether populations were formerly established on those islands. The South Australia mainland sub-species (*M. eugenii eugenii*) was also introduced to Kawau Island, New Zealand in about 1870, near Rotorua in New Zealand. Genetic analysis suggests that the population on the North Island of New Zealand originated from animals from Kawau Island.



**Figure 1.** Natural and introduced range of the Tammar Wallaby. Red dots indicate the historic and present range of the species in Australia and New Zealand. Blue dots indicate that the species is not known to have been present at those locations.

### 3.5 POTENTIAL DISTRIBUTION IN TASMANIA

Using modelling applications by the Bureau of Rural Science (DAFF), climate is compared between the species' current and historic distribution and its potential Australian distribution (shown in Figure 2). Climate modelling suggests that Tammar Wallabies are most likely to establish in northern and eastern Tasmania. Tasmania shows a moderate climate match with a third of the State having a climate match score of six.



**Figure 2.** Climate comparison between the range of *M. eugenii* and Tasmania, where 10 is a 'perfect' match and 0 is having a very dissimilar climate. Tasmania has a climate match score of 0 - 6 (Distribution source: DEC 2002, DEH 2004, Long 2003).

### 3.6 DIET AND FEEDING BEHAVIOUR

The Tammar Wallaby is a herbivore, feeding primarily on grass, however they will also feed on a variety of herbs, shrubs and small trees. Studies in Western Australia have recorded 25 species in the diet, including species with tough leaf or stem spines. The species feed on the seedlings of many perennials, and can prevent recruitment of some species (DEH 2004). For example, McArthur (1998) reported recruitment failure of *Callitris* and *Melaluca* seedlings on Garden Island due to selective grazing pressure by Tammar Wallabies.

There is some evidence to suggest that Tammar Wallabies can survive without permanent freshwater and individuals on a Western Australian island have been observed drinking seawater (DEH 2004).

### 3.7 SOCIAL BEHAVIOUR AND GROUPINGS

Social groupings between Tammar Wallabies have not been recorded, aside from females and their young-at-foot (DEH 2004). The wallabies have defined home ranges that overlap the home ranges of other individuals, therefore several individuals may be observed feeding in the same area. On Kangaroo Island home range size averages 42.4 ha in summer and 15.9 ha in winter (Inns 1980 cited in DEH 2004).

### 3.8 NATURAL PREDATORS AND DISEASE

Predators of Tammar Wallabies include Dingoes, Wedge-tailed Eagles and European Red Fox. Should a population of Tammar Wallabies establish in Tasmania, there is potential for the species to be preyed upon by Wedge-tailed Eagles and Tasmanian Devils.

A number of diseases can be fatal to Tammar Wallabies. These can be due to bacteria (e.g. lumpy jaw, tetanus), viruses (e.g. macropod herpesvirus, choroid blindness), protozoa (intestinal coccidian), and fungi (e.g. coccidiosis) (DEH, 2007; Pavlin *et al.* 2009).

Tammar Wallabies are susceptible to Tammar Wallaby Sudden Death Syndrome caused by an *Orbivirus* infection (AWHN 2011; Rose *et al.* 2000). The syndrome was observed in six research facilities and zoos in New South Wales between October and December 1998, and one research facility in Queensland in March 1999. Approximately 230 Tammar Wallabies died, the majority without obvious symptoms.

Tammar Wallabies are also vulnerable to hydatid disease, a parasitic infection caused by the tapeworm, *Echinococcus granulosus* (Barnes *et al.* 2009; Pavlin *et al.* 2009). The disease can be fatal to the wallabies (Barnes *et al.* 2009). Hydatid disease is most common in the sheep farming areas of New South Wales, the Australian Capital Territory, Victoria, southwest Western Australia, and eastern Queensland (AAS 2006). The hydatid life cycle includes a definitive and an intermediate host. Definitive hosts include carnivores such as dogs, dingoes, and to a lesser extent foxes; and intermediate hosts include sheep, cattle, goats, pigs, horses, kangaroos, wallabies and camels (DH 2008). The life cycle requires the definitive host to eat the offal of the intermediate host. The most common disease cycle involves sheep:

- offal of an infected sheep, containing the cysts, is fed to dogs;
- the tapeworms develop in the dog and produce eggs that are released in the dog's faeces; then
- grazing sheep ingest the eggs.

People can be infected by ingesting tapeworm eggs a number of ways such as patting infected dogs; having direct contact with the eggs in pasture; or having contact via an intermediate host such as flies. Infection in people does not result in the further spread of disease.

### 3.9 THREAT TO HUMAN SAFETY

Tammar Wallabies 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 if handled; causing moderate injury which may require medical attention, but serious injury is unlikely.

There is potential for Tammar Wallabies to contribute to the spread of hydatid disease on the Australian mainland. This could result in the disease spreading to humans who have contact with dogs that are fed, or feed on, infected wallaby offal. Macropods and sheep are considered the most important intermediate hosts in Victoria (DH 2008).

Hydatid disease in humans can lead to serious, and potentially fatal, health problems. Symptoms depend on the location of the cyst in the body and develop as result of pressure from the cysts that commonly reach the size of tennis balls, and in more serious cases from cysts leaking or rupturing (DH 2008). The most common site for the cysts is in the liver, although other organs such as the brain, lungs and kidneys can be affected.

### 3.10 HISTORY AS A PEST

Introduced populations of Tammar Wallabies have become agricultural and environmental pests in New Zealand. The wallaby is also considered a pest on Kangaroo Island, where it is managed as a vertebrate pest. Overabundant populations of Tammar Wallabies are culled each year on Kangaroo Island (Duka and Masters 2005). An estimated 20,000 to 40,000 animals are culled annually and this has not significantly impacted the island population (KNI 2001; Wright and Stott 1999). Wright and Stott (1999) actually measured a slight benefit to the surviving population from the cull through lower parasite burden, higher energy reserves, faster growth rates and increased fertility in males.

### 3.11 POTENTIAL IMPACT IN TASMANIA

Should Tammar Wallabies become established in Tasmania, the species is likely to have a significant impact on the State's agriculture. Tammar Wallabies could be expected to cause physical damage to crops, including forestry, and consume a large amount of pasture reserved for sheep and cattle. The closely-related Bennett's Wallaby (*Macropus rufogriseus*) is actively managed to reduce its impacts on agriculture, and a similar management approach could be anticipated for managing the impact caused by introduced populations of Tammar Wallabies. However these control efforts may be complicated by the fact that the Western Australian populations of Tammar Wallabies are more than 25-times more tolerant to I080 than Bennett's Wallabies because they have evolved in habitats with plants that produce high levels of fluoroacetate (Oliver *et al.* 1979).

Populations of native lowland grassland communities are potentially at risk. Grasses make up the bulk of the Tammar Wallabies' diet and grassland communities would provide a valuable food resource to this species. Tasmania's lowland grassland communities are recognised as nationally threatened ecological communities under the *Environment Protection and Biodiversity Conservation Act*

1999, and are threatened by heavy grazing (Commonwealth of Australia, 2009). In Tasmania, suitable climate for the Tammar Wallaby coincides with some populations of the listed lowland grassland communities.

By consuming grasses and other plants, there is the potential for this species to compete with Tasmanian native species including the Eastern Grey Kangaroo (*M. giganteus*), Bennett's Wallaby (*M. rufogriseus*) and Tasmanian Pademelon (*Thylogale billardi*).

If Tammar Wallabies established in Tasmania there could also be impacts on the future management of hydatid disease in the State. In the 1960s hydatid disease was very common in sheep and rural dogs in Tasmania. In response to a large number of human cases the government established a control program (DPIPWE 2010). This program was extremely successful and in February 1996 Tasmania was declared provisionally free of hydatid disease in dogs and sheep, and the disease is now very rare in the State. There is an ongoing control program in Tasmania to maintain provisional freedom that includes three actions:

1. Detect and remove any residual infection.
2. Minimise the risk of infection entering from the mainland.
3. Permanently identify all imported livestock to enable differentiation at slaughter.

One reason that the program was so successful in Tasmania was because Tasmanian native wallabies and kangaroos were not competent hosts for the disease. This meant that by treating domestic stock and dogs, the disease life cycle could be disrupted. Tasmania's favourable biosecurity status also contributed to the program's success because there were not large populations of other definitive hosts (feral dogs, foxes and dingos) or intermediate hosts (feral goats, pigs, horses and camels). The presence of native reservoirs and feral populations of potential hosts on the Australian mainland has meant that similar control programs interstate are not feasible.

There is potential for feral populations of Tammar Wallabies to impact on the future management of hydatid disease in Tasmania. If feral populations established in the State they could act as an intermediate host and may provide a reservoir for the disease.

**IMPORTANT:** There are potentially serious consequences for animal and human health associated with the importation of Tammar Wallabies from the Australian mainland. This risk assessment does not consider the risk that hydatid disease could be imported into Tasmania with infected wallabies. This is managed by the Animal Health and Welfare Branch of DPIPWE under the provisions of the *Animal Health Act 1995*.

## 4. Risk Assessment

### 4.1 PREVIOUS RISK ASSESSMENTS

No formal risk assessment for this species has been noted.

### 4.2 RISK ASSESSMENT

The following risk assessment determines the risk of the Tammar Wallaby to Tasmania using the Bomford model (2008).

Species:	Tammar Wallaby ( <i>Macropus eugenii</i> )	
Date of Assessment:	January 2012	
Literature search type and date:	See references	
Factor	Score	
A1. Risk posed from individual escapees (0-2)	0	Animal will not make unprovoked attacks causing injury requiring medical attention, and which even if cornered or handled, are unlikely to cause injury requiring hospitalisation.  Tammar Wallabies 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.
<b>Stage A. Risk posed by individual animals (risk that a captive or escape animal would harm people)</b>	<b>Public Safety Risk Score</b> = A1 + A2 = 0	<b>Public Safety Risk Ranking</b> A ≥ 2, Highly Dangerous A = 1, Moderately Dangerous A = 0, Not Dangerous = Not Dangerous
B1. Climate match score (1-6)	4	High climate match.  Ten squares in Tasmania with a climate match score of six.
B2. Exotic population established overseas score (0-4)	4	Exotic populations established on a large island.  Tammar Wallabies have been introduced to a number of islands off the Australian mainland, and Kawaii Island and the North Island of New Zealand (Long 2003).
B3. Overseas range size score (0-2)	0	<1 million km <sup>2</sup> .  The estimated range of the Tammar Wallaby is 530,000km <sup>2</sup> .
B4. Taxonomic class score (0-1)	1	Mammal.

<b>Stage B. Likelihood of establishment (risk that a particular species will establish a wild population in Tasmania)</b>	<b>Establishment Risk Score</b> = B1 + B2 + B3 + B4 = 9	<b>Establishment Risk Ranking</b> B = 11-13, Extreme B = 9-10, High B = 6-8, Moderate B ≤ 5, Low = High
C1. Taxonomic group (0-4)	2	<i>Marsupial</i>
C2. Overseas range size (0-2)	0	<i>Range less than 10 million km<sup>2</sup>.</i>
C3. Diet and feeding (0-3)	3	<i>Mammal that is primarily a grazer or browser.</i>
C4. Competition for native fauna for tree hollows (0-2)	0	<i>Does not use tree hollows.</i>
C5. Overseas environmental pest status (0-3)	2	<i>Moderate environmental pest in any country or region.</i> The New Zealand government has conducted eradication efforts to remove this species.
C6. Climate match to areas with susceptible native species or communities (0-5)	4	<i>50% of the geographic range of one or more susceptible native species or ecological communities that are listed as threatened under Tasmanian legislation lies within the mapped area of the six climate match classes (10, 9, 8, 7, 6, and 5).</i> Lowland grassland communities in northern Tasmania are at risk from grazing by this species.
C7. Overseas primary production (0-3)	3	<i>Major pest of primary production in any country or region.</i> Tammar Wallabies are a major agricultural pest on Kangaroo Island and in New Zealand.
C8. Climate match to susceptible primary production (0-5)	5	<i>Total commodity damage score: 424.6.</i>
C9. Spread disease (1-2)	2	<i>Mammal.</i>
C10. Harm to property (0-3)	1	<i>\$100,000 to \$1 million a year.</i> Damage to fencing could occur if this species was introduced into Tasmania.
C11. Harm to people (0-5)	1	<i>Low risk of harm to people.</i>
<b>Stage C. Consequence of Establishment (risk that an established population would cause harm)</b>	<b>Consequence Risk Score</b> = sum of C1 to C11 = 23	<b>Consequence Risk Ranking</b> C > 19, Extreme C = 15-19, High C = 9-14, Moderate C < 9, Low = Extreme
<b>ASSIGNED THREAT CATEGORY:</b>	<b>EXTREME</b>	
<b>PROPOSED IMPORT CLASSIFICATION:</b>	<b>IMPORT NOT PERMITTED</b>	

## 5. Risk Management

Based on the outcome of the risk assessment it is recommended that the Tammar Wallaby (*Macropus eugenii*) be placed on the list of species that are prohibited imports because they represent an extreme threat to Tasmania.

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# Appendices

## APPENDIX A: CALCULATING TOTAL COMMODITY DAMAGE SCORE

Column 1	Column 2	Column 3	Column 4	Column 5
<b>Industry</b>	<b>Commodity Value Index (CVI)</b>	<b>Potential Commodity Impact Score (PCIS, 0-3)</b>	<b>Climate Match to Commodity Score (CMCS, 0-5)</b>	<b>Commodity Damage Score (CDS columns 2 x 3 x 4)</b>
<b>Cattle (includes dairy and beef)</b>	<b>11</b>	<b>3</b>	<b>4</b>	<b>132</b>
<b>Timber (includes native and plantation forests)</b>	<b>10</b>	<b>3</b>	<b>4</b>	<b>120</b>
<b>Aquaculture</b>	<b>6</b>	<b>N/A</b>		
<b>Sheep (includes wool and meat)</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>60</b>
<b>Vegetables</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>45</b>
<b>Fruit (includes wine grapes)</b>	<b>5</b>	<b>2</b>	<b>4</b>	<b>40</b>
<b>Poultry (including eggs)</b>	<b>1.5</b>	<b>N/A</b>		
<b>Cereal grain (includes wheat, barley, sorghum etc)</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>12</b>
<b>Other crops and horticulture (includes nuts and flowers)</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>12</b>
<b>Pigs</b>	<b>1</b>	<b>N/A</b>		
<b>Bees (includes honey, beeswax, and pollination)</b>	<b>0.5</b>	<b>N/A</b>		
<b>Oilseeds (includes canola, sunflower etc)</b>	<b>0.5</b>	<b>N/A</b>		
<b>Grain legumes (includes soybeans)</b>	<b>0.3</b>	<b>3</b>	<b>4</b>	<b>3.6</b>
<b>Other livestock (includes goats and deer)</b>	<b>0.3</b>	<b>3</b>	<b>4</b>	<b>3.6</b>
<b>Total Commodity Damage Score (TCDS)</b>				<b>428.2</b>

## APPENDIX B: ASSIGNING SPECIES TO THREAT CATEGORIES

<b>A: Danger posed by individual animals</b> (risk a captive or escaped individual would harm people)	<b>B: Likelihood of establishment</b> (risk that a particular species will establish a wild population in Tasmania)	<b>C: Consequence of establishment</b> (risk that an established population would cause harm)	<b>Threat category</b>	<b>Implications for any proposed import into Tasmania</b>
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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