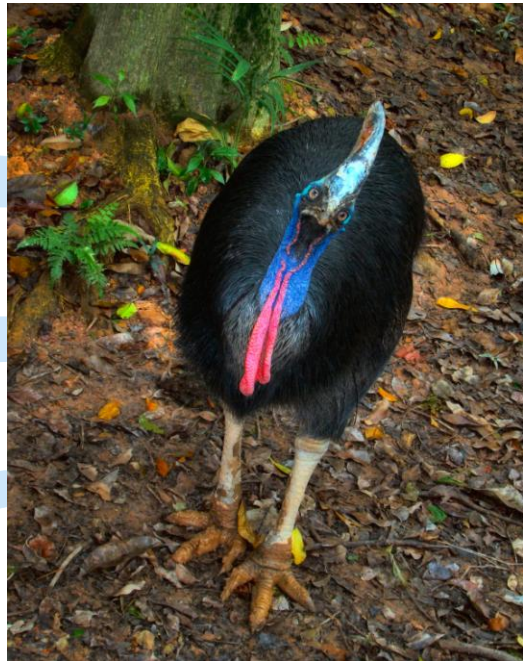


PEST RISK ASSESSMENT

Southern Cassowary

Casuarius casuarius



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September 2011

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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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I. Summary

The Southern Cassowary is a large flightless bird native to Australia, Papua New Guinea and Indonesia, where it is probable that its presence on some small islands is due to deliberate introduction.

It is currently listed as “vulnerable” under the IUCN Red List, and is listed as ‘Endangered’ under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. The Southern Cassowary is a ‘controlled animal’ under the *Tasmanian Nature Conservation Act 2002*.

Climate modelling suggests that it is unlikely that the Southern Cassowary could become established in Tasmania.

Cassowaries are known to attack people, and therefore pose a distinct threat to human safety that needs to be carefully managed.

This risk assessment concludes that Southern Cassowaries pose a serious threat to Tasmania and recommends that imports be restricted to those license holders approved for keeping serious threat species.

2. Introduction

2.1 NAME AND TAXONOMY

Kingdom:	Animalia
Phylum:	Chordata
Class:	Aves
Order:	Casuariiformes
Family:	Casuariidae
Genus:	<i>Casuarus</i>
Species:	<i>C. casuarus</i> (Linnaeus, 1758)



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Sub-species: No subspecies are currently formally recognised. However, up to eight have previously been described, with the Australian Southern Cassowary named as *C. casuarus johnsonii* (Latch 2007).

Common names (including industry or trade names): Southern Cassowary; Double-wattled Cassowary; Two-wattled Cassowary; Australian Cassowary

Known hybrids: Natural hybrids of *C. casuarus* and *Casuarus unappendiculatus* are thought to occur.

Close relatives: *Casuarus unappendiculatus*, Northern Cassowary; *Casuarus bennetti*, Dwarf Cassowary.

2.2 DESCRIPTION

The Southern Cassowary, *Casuarus casuarus*, is a large, flightless land bird and is the largest native vertebrate in Australian rainforests. Adults grow to two metres tall with males up to 55kg and females, usually larger, up to 76kg (Westcott and Reid 2002, QPWS unpub. data, cited in Latch 2007).

Adults have shiny black plumage and a distinctive neck and head: brilliant blue and purple with two long, drooping red wattles either side of the neck and amber eyes. The adult colouring begins to develop between two and four years of age, as does the tall helmet or casque, which continues to grow with age. Cassowaries have powerful legs, and each foot has three toes, with the inside toe bearing a large dagger-shaped claw. The sexes are fairly similar though females are slightly larger (Latch 2007).

Newly hatched chicks are striped dark brown and creamy white. After three to six months the stripes fade and the plumage changes to brown. As the young mature the plumage darkens, the wattles and casque develop, and the skin colour on the neck and wattles brighten.

2.3 CONSERVATION AND LEGAL STATUS

CONSERVATION STATUS

The Southern Cassowary is currently listed as “vulnerable” under the IUCN Red List (Birdlife International 2008).

LEGAL STATUS

The Southern Cassowary is listed as ‘Endangered’ under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. Under the *Queensland Nature Conservation Act 1992*, the Wet Tropics population is listed as ‘Endangered’ and the Cape York populations are listed as ‘Vulnerable’.

The Southern Cassowary is a ‘controlled animal’ under the *Tasmanian Nature Conservation Act 2002*.

3. Biology and Ecology

3.1 LIFE HISTORY

Southern Cassowaries nest on the ground, usually near the base of a large tree or stump with a closed understorey of vines, regrowth or dense grass thickets. Eggs are laid on the bare ground and the adult gathers twigs and vegetation around itself during incubation. Nests do not appear to be used more than once (Bentrupperbäumer 1998; Garnett & Crowley 2000, cited in Department of Sustainability, Environment, Water, Population and Communities, 2011).

Southern Cassowaries first breed at around 3.5 years old, though males possibly breed earlier (2.5 years) while still in brown juvenile plumage. The generation length of the Southern Cassowary is estimated, with low reliability, to be 10 years. Cassowaries are known to be long-lived, with anecdotal records that birds can live for over 29 years in the wild and captive birds for 18–50 years (Department of Sustainability, Environment, Water, Population and Communities, 2011).

Female Southern Cassowaries may lay several clutches of three to five olive-green eggs during the breeding season that runs from June to October. These are laid directly onto the forest floor. Males incubate the clutch for about 50 days before raising the young alone for about a year (Bentrupperbäumer 1998). Young birds must then seek their own home range, but with limited opportunities, particularly due to high fragmentation and loss of habitat, the sub-adult mortality rate is probably high.

Cassowaries are solitary, long-lived, slow-reproducing animals with lengthy parental care and probable low natural juvenile survival. The slow recruitment rate of cassowaries makes it difficult to determine the long-term viability of isolated populations. The persistence of individuals in patches of remnant habitat may not necessarily mean that the population is viable and will persist long-term (Latch 2007).

3.2 HABITAT REQUIREMENTS AND PREFERENCES

The Southern Cassowary occurs primarily in tropical and sub-tropical rainforest and associated vegetation mosaics. On Cape York, 98 per cent of all cassowary records that could be confidently associated with a habitat type were from seven vine forest types. The majority of records are from mesophyll forest types (43 per cent) and notophyll vine-forest (24 per cent) (QPWS 2003).

The Southern Cassowary will also use woodland, swamp and disturbed habitats as intermittent food sources and as connecting habitat between more suitable sites (Crome and Moore 1993; Bentrupperbäumer 1998, cited in Latch 2007).

The Southern Cassowary requires a high diversity of fruiting trees to provide a year-round supply of fleshy fruits. While some habitats may be important only briefly in the annual cycle of food production, they may be crucial to the survival of cassowaries whose home range encompasses them (Bentrupperbäumer 1998). At times of food stress in the rainforest, such as after cyclones, food resources in non-rainforest habitats may be more important (Crome and Moore 1990, cited in Latch 2007).

Besides sources of food, the subspecies requires habitat with a suitable water supply (for daily drinking and bathing), high-level foliage cover to provide shelter, and protected places for nesting. (Bentrupperbäumer 1998, cited in Department of Sustainability, Environment, Water, Population and Communities, 2011).

3.3 NATURAL GEOGRAPHIC RANGE

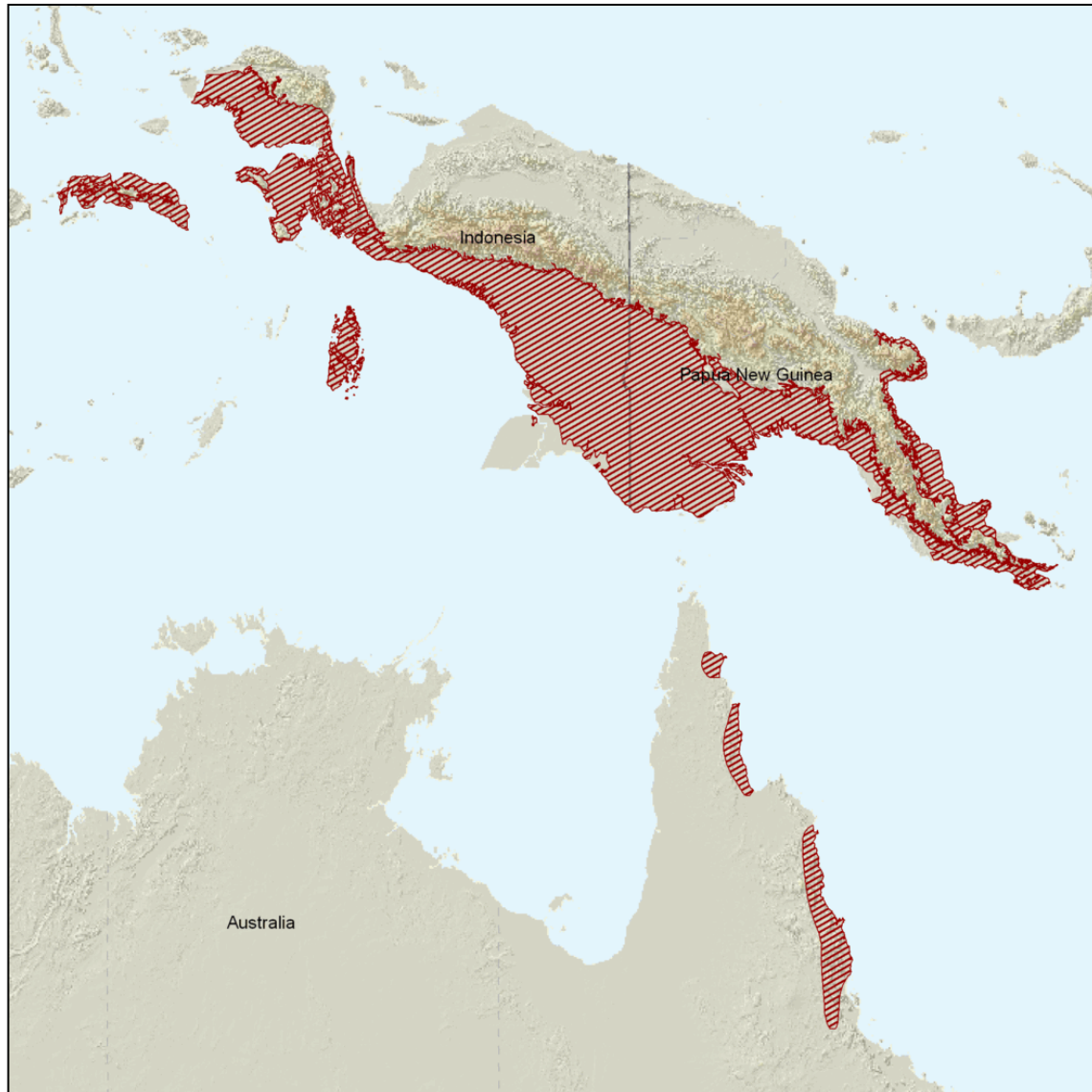


Figure 1. Native resident range of the Southern Cassowary (*Casuarius casuarius*), (modified from BirdLife International 2008).

The Southern Cassowary is found in north-eastern Australia, the Indonesian islands of Seram (where it is probably introduced) and Aru, and the island of New Guinea, which includes the Indonesian province of Papua, (formerly Irian Jaya), and Papua New Guinea.

In Australia, there are 3 subpopulations in Queensland. In the Wet Tropics it is distributed widely from Cooktown to just north of Townsville. Core habitat is coastal lowlands between Ingham and Mossman, and uplands in the southern Atherton Tablelands and other ranges. On Cape York, it occurs as two disjunct populations in vine-forest communities: one in the Macllwraith and Iron Ranges, the other in Shelburne Bay. The Australian population is estimated at approximately 2000 birds and is declining.

The Southern Cassowary occurs throughout the lowlands of New Guinea except for the northern watershed from the Vogelkop to the Huon Peninsula. In Papua and adjacent islands, the species' status is unclear, but it may be more common than in Papua New Guinea. In Papua New Guinea, Southern Cassowaries have declined, and are now absent in some locations, including remote areas (Birdlife International 2008).

The total occupation range of the Southern Cassowary is estimated at 396,000 km² (Birdlife International 2008).

3.4 INTRODUCED GEOGRAPHIC RANGE

There are no confirmed introductions of the Southern Cassowary, but it is considered likely that this species has been deliberately introduced to some islands, including Aru and Seram in the Maluku Islands of eastern Indonesia. This has most likely been done by the indigenous inhabitants of these islands to provide a food source (Birdlife International 2008).

3.5 POTENTIAL DISTRIBUTION IN TASMANIA

Using modelling applications by the Bureau of Rural Science, a climate comparison between the species' current distribution and potential Australian distribution is shown in Figure 2. Modelling indicates that northern Australia has areas of similar climate that may support the establishment of additional Southern Cassowary populations. Tasmania's climate is not suitable (highest climate match score: 0).

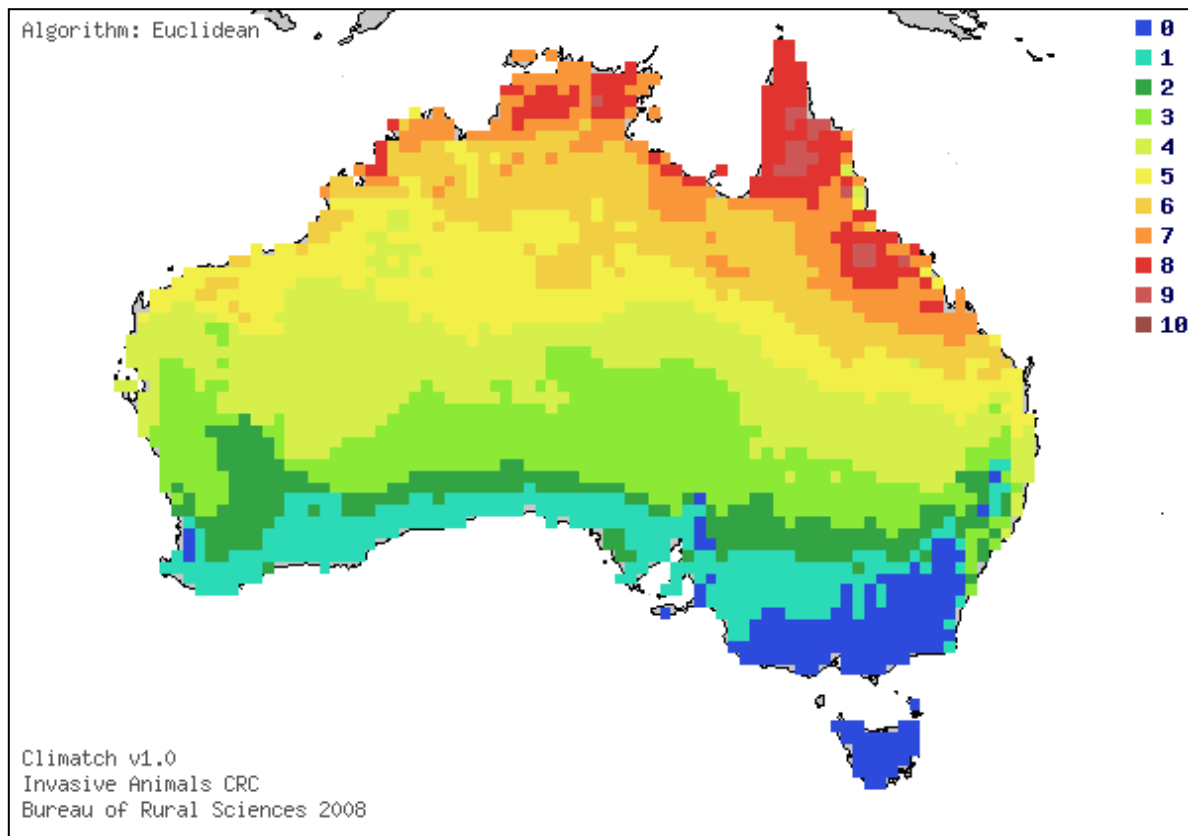


Figure 2. Climate comparison between the natural range of *C. casuarius* and Australia, where 10 is a 'perfect' climate match and 0 is having a very dissimilar climate. Tasmania shows a match of 0.

3.6 DIET AND FEEDING BEHAVIOUR

The diet of the Southern Cassowary includes fleshy fruits of up to 238 plant species, including seven exotics (Westcott et al. 2005, cited in Latch 2007). While fallen fruit is the primary food source, cassowaries also eat small vertebrates, invertebrates, fungi, plants and carrion (Marchant and Higgins 1990). Cassowaries forage for about 35 per cent of the day, mainly early morning and late afternoon (Westcott et al. 2005, cited in Latch 200).

A large majority of seeds ingested by cassowaries retain their viability and are passed whole (Stocker and Irvine 1983, Crome and Moore 1990, Bentrupperbäumer 1998). It has been demonstrated that passage of some seeds through cassowaries can improve germination rates (Webber and Woodrow 2004).

3.7 SOCIAL BEHAVIOUR AND GROUPINGS

The cassowary is territorial and solitary, with contact between mature individuals generally only tolerated during mating. Males defer to females when they encounter one another. Sexes will

maintain independent but overlapping home ranges with female home ranges encompassing those of one to several males (Bentrupperbäumer 1998, cited in Latch 2007).

Home ranges fluctuate depending on season and availability of fruit, with estimates of between 0.52km² to 2.35km² recorded (Bentrupperbäumer 1998; Moore and Moore 2001, cited in Latch 2007). Cassowaries may also tolerate each other in areas of super abundant fallen fruit and have been known to congregate in areas when artificially fed on a regular basis (QPWS unpublished, cited in Latch 2007).

3.8 NATURAL PREDATORS AND DISEASE

The most significant predators of cassowaries in Australia are dogs and possibly pigs (Birdlife International 2008).

Known diseases include aspergillosis and avian tuberculosis. Cassowaries are also known to be susceptible to internal parasites, particularly ascarids (roundworms).

Avian tuberculosis is a ubiquitous disease with the organism found in the environment including soil and water. A chronic wasting disease, it has been diagnosed post mortem with six recent cases between 2002 and 2005 in the Mission Beach and Atherton Tablelands areas (QPWS unpublished data, cited in Latch 2007). Aspergillosis is possibly a secondary disease of debilitated cassowaries causing respiratory symptoms and ultimately mortality. Because aspergillosis is an opportunistic infection, stress and malnutrition may contribute to immunosuppression and increased susceptibility to the disease (Oglesbee et al. 1997, cited in Latch 2007).

3.9 THREAT TO HUMAN SAFETY

The Southern Cassowary is capable of causing serious injuries to humans. There have been 150 recorded attacks on humans, eight of which have resulted in serious injury, with one attack resulting in death. The eight seriously-injured victims suffered puncture wounds, lacerations, cuts, and/or broken bones, one of them subsequently dying. Five of the eight attacks were by cassowaries that had been fed previously by people, and in the single fatal cassowary attack recorded in Australia the victim was trying to kill the cassowary. Of 150 recorded incidents of cassowary attacks on humans, 75 per cent were known or suspected as being feeding-related (Kofron 2003).

3.10 HISTORY AS A PEST

There are no records of the Southern Cassowary as either an environmental or agricultural pest.

3.11 POTENTIAL IMPACT IN TASMANIA

The Southern Cassowary would potentially compete with Tasmanian frugivores, such as possum species including the Common Brushtail Possum (*Trichosurus vulpecula*), Common Ringtail Possum

(*Pseudocheirus peregrinus*), Eastern Pygmy Possum (*Cercartetus nanus*) and Little Pygmy Possum (*Cercartetus lepidus*) (Strahan 1995). As there is unlikely to be sufficient fruit available in Tasmanian forest habitats it is likely that Southern Cassowaries would also consume invertebrates and small vertebrates. Therefore other species which may experience some competition from the Southern Cassowary include the Eastern Quoll (*Dasyurus viverrinus*), Southern Brown Bandicoot (*Isodon 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 Southern Cassowary, should populations establish in Tasmania, feeding on fruit could impact on the fruit production.

4. Risk Assessment

4.1 PREVIOUS RISK ASSESSMENTS

There have been no risk assessments undertaken for this species.

4.2 RISK ASSESSMENT

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

Species:		Southern Cassowary (<i>Casuarius casuarius</i>)
Date of Assessment:	September 2011	
Literature search type and date:	See references	
Factor	Score	
A1. Risk posed from individual escapees (0-2)	2	<i>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.</i> Southern Cassowaries have attacked and seriously injured people; one death has been verified.
A2. Risk to public safety from individual captive animals (0-2)	0	<i>Nil or low risk (highly unlikely or not possible).</i> The risk to public safety from irresponsible use of products obtained from cassowaries is low.
Stage A. Risk posed by individual animals (risk that a captive or escape animal would harm people)	Public Safety Risk Score = A1 + A2 = 2	Public Safety Risk Rank A ≥ 2, Highly Dangerous A = 1, Moderately Dangerous A = 0, Not Dangerous = Highly Dangerous
B1. Climate match score (1-6)	1	<i>Low climate match score.</i> Sum of squares for match classes 10 to 6: 0 (low).
B2. Exotic population established overseas score (0-4)	2	<i>No exotic populations ever established.</i> Some Indonesian island populations suspected as the result of introductions
B3. Overseas range size score (0-2)	1	<i>Overseas range class of less than 1 million km², with range estimated at 396,00 km² (includes current and past 1000 years, natural and introduced range., and Australian range (Latch 2007)</i>
B4. Taxonomic class score (0-1)	0	<i>Bird.</i>
Stage B. Likelihood of establishment (risk that a	Establishment	Establishment Risk Rank

particular species will establish a wild population in Tasmania)	Risk Score = B1 + B2 + B3 + B4 = 4	B = 11-13, Extreme B = 9-10, Serious B = 6-8, Moderate B ≤ 5, Low = Low
C1. Taxonomic group (0-4)	0	<i>Bird not in one of the orders that have been demonstrated to have detrimental effects on prey abundance and/or habitat degradation</i>
C2. Overseas range size (0-2)	0	<i>Overseas geographic range class less than 10 million square kilometres. The range of Southern Cassowaries is estimated at 396,00 km².</i>
C3. Diet and feeding (0-3)	0	<i>Bird</i>
C4. Competition for native fauna for tree hollows (0-2)	0	<i>Does not use tree hollows.</i>
C5. Overseas environmental pest status (0-3)	0	<i>Never reported as an environmental pest in any country or region.</i>
C6. Climate match to areas with susceptible native species or communities (0-5)	0	<i>The species has no grid squares within the highest six climate match classes (i.e. 10 to 5) that overlap the distribution of any susceptible native species or ecological communities</i>
C7. Overseas primary production (0-5)	0	<i>No reports of damage to crops or other primary production in any country or region.</i>
C8. Climate match to susceptible primary production (0-5)	0	<i>None of the commodity is produced in areas where the species has a climate match within the highest eight climate match classes</i>
C9. Spread disease (1-2)	2	<i>All mammals and birds (likely or unknown effect on native species and on livestock and other domestic animals).</i>
C10. Harm to property (0-3)	0	<i>Total annual dollar value of damage if the exotic species established throughout the area which it has a climate match within the highest six classes (classes 10 to 5): \$0. There is no evidence of Southern Cassowaries causing significant impact on the environment or agriculture.</i>
C11. Harm to people (0-5)	4	<i>Southern Cassowaries have been known to cause serious injury/death but the number of people at risk is likely to be small.</i>
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, Serious C = 9-14, Moderate C < 9, Low = Low

ASSIGNED THREAT CATEGORY:	SERIOUS
PROPOSED IMPORT CLASSIFICATION:	IMPORT RESTRICTED TO THOSE COLLECTIONS APPROVED FOR KEEPING SERIOUS THREAT SPECIES

5. Risk Management

This risk assessment concludes that the Southern Cassowary (*Casuarius casuarius*) is a serious threat to Tasmania and that imports be restricted to those license holders approved for keeping serious threat species. On the basis of this risk assessment, it is recommended that the Southern Cassowary 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 conditions may be required.

1. The animal must not be released, or be allowed to escape from effective control.
1. Specimens seized or forfeited as a result of illegal or accidental introductions, where rehousing is not available, will be humanely euthanized.
2. Animal welfare requirements under the *Animal Welfare Act 1993* and any approved Code of Practice or Management Plan must be met.
3. Import only permitted by holders approved to keep the species under licence.
4. Individuals to be micro-chipped or otherwise identified, or treated to allow identification.
5. Facility must meet minimum standards for welfare and security.
6. Facility must be available for inspection at any reasonable time.
7. Audits of facilities and collections.
8. 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.
9. Written approval prior to movement of animals between facilities and trade of species under licence.
10. Record keeping and reporting to DPIPWE as required by DPIPWE.
11. Collections containing species subject to approval by DPIPWE as meeting best practice for keeping the species concerned.
12. Bonds, insurance or cost recovery systems.
13. Import of serious threat species will generally be prohibited unless there is a clear public benefit and sufficient measures exist for the secure housing and on-going management of the species. Species kept solely for:
 - Public display and education purposes approved by DPIPWE and/or
 - Genuine scientific research approved by DPIPWE.

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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	N/A		
Timber (includes native and plantation forests)	10	N/A		
Aquaculture	6	N/A		
Sheep (includes wool and meat)	5	N/A		
Vegetables	5	N/A		
Fruit (includes wine grapes)	5	1	0	0
Poultry (including eggs)	1.5	N/A		
Cereal grain (includes wheat, barley, sorghum etc)	1	N/A		
Other crops and horticulture (includes nuts and flowers)	1	N/A		
Pigs	1	N/A		
Bees (includes honey, beeswax, and pollination)	0.5	N/A		
Oilseeds (includes canola, sunflower etc)	0.5	N/A		
Grain legumes (includes soybeans)	0.3	N/A		
Other livestock (includes goats and deer)	0.3	N/A		
Total Commodity Damage Score (TCDS)				0

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	Serious		
Highly, Moderately or Not Dangerous	Extreme	Moderate		
Highly, Moderately or Not Dangerous	Extreme	Low		
Highly, Moderately or Not Dangerous	Serious	Extreme		
Highly, Moderately or Not Dangerous	Serious	Serious		
Highly, Moderately or Not Dangerous	Moderate	Extreme		
Highly, Moderately or Not Dangerous	Serious	Moderate	Serious	Import restricted to those collections approved for keeping serious threat species
Highly, Moderately or Not Dangerous	Serious	Low		
Highly, Moderately or Not Dangerous	Moderate	Serious		
Highly Dangerous	Moderate	Moderate		
Highly Dangerous	Moderate	Low		
Highly, Moderately or Not Dangerous	Low	Extreme		
Highly, Moderately or Not Dangerous	Low	Serious		
Highly Dangerous	Low	Moderate		
Highly Dangerous	Low	Low		
Moderately or Not Dangerous	Moderate	Moderate		
Moderately or Not Dangerous	Moderate	Low		
Moderately or Not Dangerous	Low	Moderate		
Moderately Dangerous	Low	Low		
Not Dangerous	Low	Low	Low	Import Permitted
Unknown	Any value	Any value	Extreme until proven otherwise	Prohibited
Any Value	Unknown	Any value		
Any Value	Any value	Unknown		
Unassessed	Unassessed	Unassessed		



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