

Cane Toad (*Rhinella marina*) (Linnaeus, 1758)

Current status: Declared s.22(2) (see Current Status Data at end for details)	
Summary of review	
Recommended Status:	Declared s.22(2)
Management:	
Keeping:	Prohibited

Evaluation against criteria used to determine Organism Status (s.11, s.22 or s.12)

CRITERION 1: Identifiable

Full taxon name:	<i>Rhinella marina</i>	
Genus:	<i>Rhinella</i>	
Species:	<i>marina</i>	Author: <i>Linnaeus, 1758</i>
Synonym	<i>Bufo marinus</i>	
Common name:	Cane Toad	

Description: World's second largest toad, up to 150mm snout-vent length. Squat body and short legs, colour brown, olive-brown or reddish-brown above with dark brown caps to warts, whitish or yellow below speckled or mottled with dark brown. Juveniles have a series of narrow dark bars, dashes or lines on the head and back. A pair of parotoid glands are located behind each eye. Fingers are free, toes have tough leather webbing. Tadpoles, <35mm long are jet black above and silvery white with black spots below (Cameron 2002; Churchill 2003; Cogger 2000; Lever 2001; Robinson 2002).

CRITERION 2: Presence in Western Australia

Is the organism Indigenous or Exotic to WA?

Cane toads are exotic to WA and were introduced into Australia in 1935 as a biocontrol of scarab beetles, pests of sugarcane. Once populations became established the toad spread rapidly to the coast and hinterland of eastern Queensland and into the northern river regions of New South Wales. The distribution is extending each year into western Queensland, the Northern Territory and WA (Cameron 2002; Churchill 2003; Cogger 2000; Department of the Environment and Heritage 2004; Lannoo 2005; Lever 2006).

Is it present in WA?

Cane toads are present in northern WA.

Is it present in the State in public or private gardens/collections?

Cane toads are kept for display purposes in WA (Invasive Species Program 2013).

CRITERION 3: Potential for adverse effects

The species is assessed as extreme threat category by the national Invasive Plants and Animals Committee (IPAC) (Page 2008). Extreme threat species are considered to be species that should not be allowed to enter Australia, nor be kept in any state or territory unless sufficient risk management measures exist to reduce the potential risks to an acceptable level (Department of Agriculture 2014).

Due to their biological effects, cane toads are listed as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999* (EPB Act) (DEH 2005). A threat abatement plan was developed to provide a national strategy for governments and all other jurisdictions to reduce the impacts of cane toads across their known and anticipated range in Australia (SEWPaC 2011).

The species is very robust and can survive up to 50% body-water loss and a temperature range of 5-40°C (Cameron 2002; Churchill 2003), and a relatively long maximum lifespan of 24.8 years (de Magalhaes and Costa 2009). The toads can breed in a variety of water bodies - slow or still shallow waters of ponds, ditches, temporary pools, reservoirs, canals and streams; and tolerate salinity levels of 15% (Cameron 2002; Solis, Ibanez *et al.* 2004). Up to 20,000 black eggs produced in long jelly strings about 3mm thick are attached to submergent or emergent aquatic plants (Gray and Massam 2005; Lannoo 2005).

Cane toads are non-specific and aggressive predators, eating almost anything that can be swallowed, including dog food and faeces, carrion and household scraps. The general diet is insects and beetles, honey bees, ants, termites, crickets, centipedes and bugs; spiders, scorpions, marine snails, small toads, frogs and snakes and occasionally small mammals (Churchill 2003; Freeland 1986; Lever 2001; Robinson 2002; Solis, Ibanez *et al.* 2004). The prey size is largely limited by the toad's jaw gape and the distension of its stomach (Lannoo 2005). The tadpoles eat algae and other aquatic plants and also filter organic matter from the water; large tadpoles sometimes eat cane toad eggs (Churchill 2003; Lannoo 2005).

Harm to people and pets: Cane toad eggs, tadpoles, juveniles and adults are all toxic if eaten. When attacked or under threat the cane toad exudes a toxic milky liquid (bufotoxin) from the parotid glands. The secretion is toxic to people and most other animals, including domestic pets (Churchill 2003; Lannoo 2005; Mattison 1993; Reeves 2004; Roberts, Aronsohn *et al.* 2000). The toxin is absorbed through the mucous membranes (eyes, mouth and nose), and people can experience skin irritation, burning sensations of the eyes, intense pain, temporary blindness and inflammation (Cameron 2002; Robinson 2002).

Agriculture: Cane toads occur in a variety of agricultural habitats, including sugarcane fields, pastures, banana plantations, coconut plantations and rice fields (Hinkley 1962; Lever 2006). It can consume sufficient numbers of honey bees to be a management problem for bee-keepers as the toads tend to congregate around the entrance to hives (Churchill 2003). To combat this predation, hives are placed on moveable wooden stands, a labour intensive and expensive procedure.

Environment: Cane toads will eat some native animals, including young snakes, frogs and small marsupials. Although vertebrates comprise a relatively small percentage of the toads' diet, such predation can have a significant effect on susceptible populations (Lever 2006), particularly those already threatened or endangered (Department of the Environment and Heritage 2004; SEWPaC 2011). Crocodiles, large lizards, some snakes, and endemic *Dasyurus* species are especially vulnerable to bufotoxin, and there are numerous reports of such species virtually disappearing locally following colonisation of the area by toads (Letnic M, Webb JK *et al.* 2008; Lever 2006).

Adult cane toads compete with some native animals for shelter and refuges, as well as compete with native frogs for breeding sites, such as *Litoria caerulea* the common green tree frog. The cane toad is a more prolific breeder than most northern Australian frogs and its tadpoles assemble in huge congregations which assists them to outcompete the native tadpoles (Department of the Environment and Heritage 2004; Lever 2006).

It has been estimated that cane toads threaten the populations of approximately 30% of terrestrial Australian snake species as most have a low tolerance to the bufotoxin (Phillips, Brown *et al.* 2003).

The presence of cane toads in Kakadu National Park has been linked to a marked decline in the Northern Quoll (*Dasyurus hallucatus*) and large *Varanid* goanna species (Department of the Environment and Heritage 2004). Along the Daly River in the Northern Territory (NT), the number of Yellow-spotted Monitor Lizards (*Varanus panoptes*) has decline as a result of eating the cane toad (Doody, Green *et al.* 2006).

Cane toads are active nest predators and competitors of ground-nesting Rainbow Bee-eaters (*Merops ornatus*) as the toads invade and take over the bird's burrows and prey upon their eggs and nestlings (Boland 2004).

Many native animals that prey on native frogs, their eggs and tadpoles are at risk from the bufotoxin as well as from competition for food or disease transmission from cane toads (Churchill 2003).

Alternatively, Australian Black Snakes (*Pseudechis porphyriacus*) appear to have developed a physiological resistance to the toxin and have learnt to avoid cane toads as prey (Phillips and Shine 2006). Also laboratory trials have shown that native rodent species *Melomys burtoni*, *Rattus colletti* and *Rattus tunneyi* are able to eat small cane toads with minimal or nil toxic effects (Cabrera-Guzmán, Crossland *et al.* 2015).

The presence of cane toads has significantly reduced invertebrate abundance and species richness of a NT tropical floodplain to about the same degree as did an equivalent biomass of native frog species. It was concluded from the research that if cane toads simply replaced native frogs, the reduction in density of invertebrates would likely be similar to that prior to cane toad invasion (Greenlees, Brown *et al.* 2006).

Recent research has shown that the interaction between the cane toad and Australian native species is complex, as although many predatory animals die as a result of eating toads other native animals are either unaffected or actually gain a benefit from the presence of the toad (Beckmann, Crossland *et al.* 2011; Cabrera-Guzmán, Crossland *et al.* 2015; Letnic M, Webb JK *et al.* 2008; Richard Shine 2010).

CRITERION 4: Potential for establishment or spread or increase in numbers

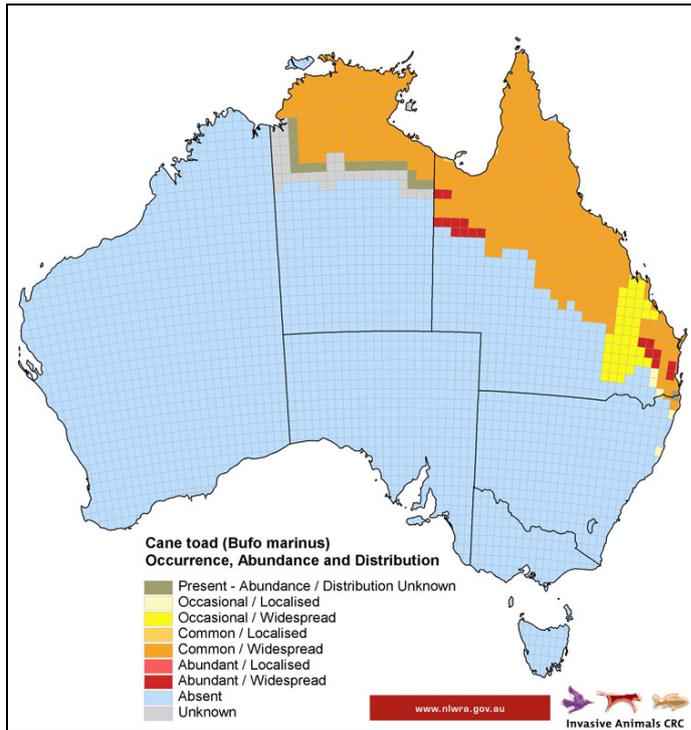
The cane toad is nocturnal and terrestrial and inhabits humid areas with adequate cover as in moist forest and woodlands, open forest, grasslands and beach dunes. It thrives in degraded habitats and man-made environments but is occasionally found in pristine lowland and montane rainforests. Generally, the toad prefers open or disturbed habitats such as tracks, roads, low grassland and areas near human disturbed areas like grazing lands, suburban parks and gardens. It tends to avoid more densely vegetated areas such as wet sclerophyll and rainforest which can be a barrier to their dispersal (Cogger 2000; Lever 2001; Solis, Ibanez *et al.* 2004). Introduced cane toads are found mainly in disturbed areas, as around buildings, on roads, in yards and suburban gardens, near canals and ponds (Churchill 2003; Lever 2006).

Cane toads currently occupy about 20% of Australia and have rapidly spread across northern Australia (Invasive Animals CRC 2008). The populations have been observed to increase dramatically within a short period, and the density of adult toads here exceeds that of their natural range (Lannoo 2005), having a population density of 50-150 toads per hectare (NatureServe 2007). In Australia, the cane toad's north-westerly advance is at a rate of 27-40 km/year (Lannoo 2005).

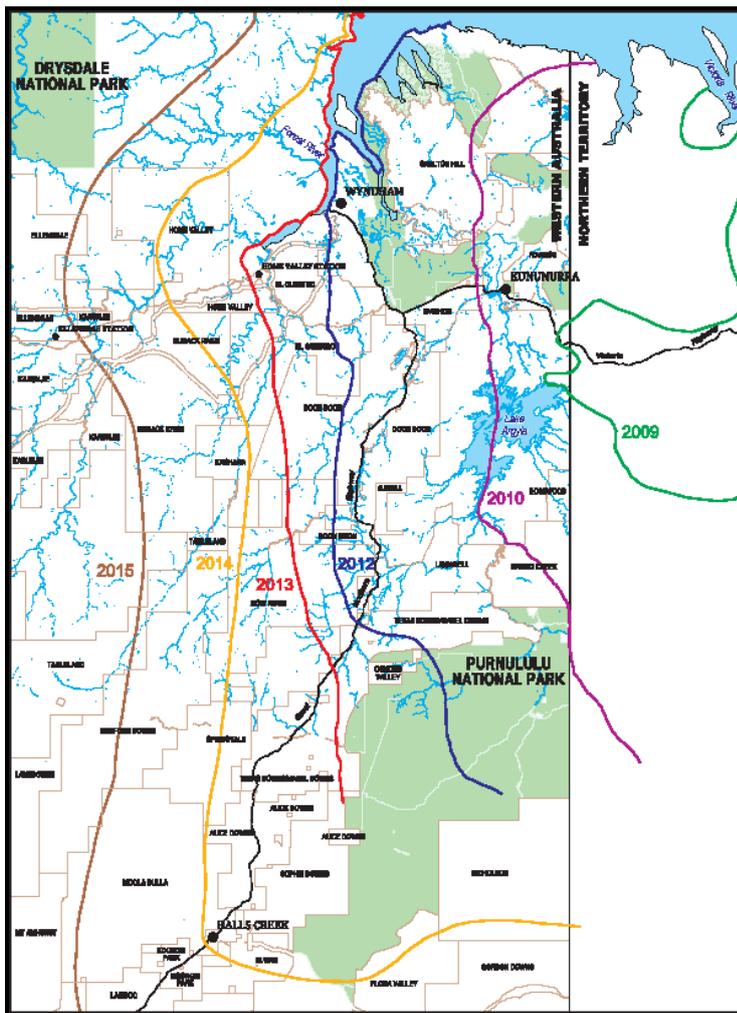
The cane toad is present throughout the east Kimberley region where the invasion front is west of Halls Creek at Kurunje. It continues to expand its range southwards unassisted at about 1.3 km a year and is also accidentally transported via freight and vehicle movement.

Although control activities to slow or halt the cane toad's spread in WA have been carried out by community groups, supported by state and national government funding such as Kimberley Toad Busters and Stop the Toad Foundations, the invasion front continues to move westward. Breeding site availability is a limiting factor in the movement of cane toads inland.

Climate change is predicted to reduce the length of the cane toad’s breeding season by up to four months across much of northern Australia (Kearney, Phillips *et al.* 2008). Newly metamorphosed toads less than 30mm stay within 1 to 5m of the water and disperse within 3 to 4 days returning to water when they are about 90mm (Lannoo 2005). As the toads get older and larger they are found at greater distances from water (Lannoo 2005). A distribution map of its current Australian as well as predicted distribution in future years is available in (Urban, Phillips *et al.* 2007).



Map 1: Occurrence of Cane Toad in Australia (PestSmart 2007). Scale indicates numbers of records.



Map 2 WA cane toad invasion fronts 2009 to 2015 (DPaW 2015)

CRITERION 5: Subject to current or planned regulatory activities

The cane toad is not a high priority declared animal for DAFWA based on the prioritisation process for declared vertebrates (Loo and Reeves 2015). Results from Department of Agriculture and Food (DAFWA) Declared Animals Impact Assessment (Petersen, Kirkpatrick *et al.* 2014) scored the cane toad low for agriculture impact and high for environmental impact.

DAFWA has carried out control and compliance activities for cane toads in the past, however there are no current or planned activities. DAFWA does assist in preventing its establishment and spread in WA by regulating the keeping of cane toads as prohibited keeping category, restricted to the issue of a permit with conditions for educational and display purposes only.

The State Government has invested more than \$7.8 million in the fight against cane toads in cooperation with stakeholder community groups, Local Government, Indigenous Groups, universities and the Australian Government. Programs which

have been initiated include; a field-based cane toad surveillance and response team, biological surveys, strengthened quarantine measures, education and public awareness campaigns (phone app and a free-call hotline), cane toad collection drop-off points and research projects.

The National Government's ten year cane toad management strategy was initiated in 2009 then revised into the WA cane toad strategy 2014-17 for management by the Department of Parks and Wildlife (DPaW) (DPaW 2014).

This WA strategy aims to;

- Maximise understanding of cane toads, their impacts and management options
- Minimise the impact of cane toads in the State
- Implement long-term cane toad management.

The movement of the cane toad within the state is regulated under the *Biosecurity and Agriculture Management Act (2007)* (BAM Act) and the Regulations; it is an offence under the act to move a cane toad from the place where it is found, or to release it into the environment, or supply it to another person. There are penalties under the Act for committing these offences.

The import of cane toads is regulated under the *Wildlife Conservation Act 1970* (WC Act) (Department of Parks and Wildlife 2014), and as part of the procedure at the border DAFWA stops this species to collect evidence and verify its identification.

Section 24 of the Animal Welfare Act 2002 (AW Act) provides a defence against a charge of animal cruelty for the killing of pests. Regulation 5 of the Animal Welfare (General) Regulations 2003 prescribes pests as "an animal set out in a BAM Act list", that is animals declared under section 12 or section 22 of the BAM Act.

Summary: When assessed against the five criteria for determination of declaration status (sections 11, 12 or 22), the cane toad has low agricultural impact, high environmental impacts and potential to spread and establish in new areas of WA. There is justification for regulatory activities. It does not meet the criteria for declaration as s.12 or s.11.

CRITERION 1: Identity confirmed
CRITERION 2: Meets the criteria
CRITERION 3: Meets the criteria as an environmental pest
CRITERION 4: Meets the criteria
CRITERION 5: Meets the criteria
Organism Status Recommendation: Declared pest s.22(2)

Determination of control and keeping categories

Evaluation against criteria used for assigning Control and Keeping Categories to a Declared Pest or Prohibited Organism (C1, C2 or C3)

Exclusion C1

1. *Not known to be present in WA.*
The cane toad is restricted to the Kimberley region.
2. *Is assessed as being cost-effective to exclude because;*
Restricted distribution, not present below the 20 degree of latitude

Eradication C2

No current or planned control activity by DAFWA
State cane toad strategy management by DPaW
Eradication not achievable with current available techniques

Management C3 Cannot be applied to a prohibited organism (s12)

1. *Present in the area*
Not widespread in the state, presence restricted to the Kimberley.

CRITERION C1: Meets the criteria
CRITERION C2: Does not meet the criteria
CRITERION C3: Does not meet the criteria

Control Categories Recommendation: C1

Area Declared: South of 20° latitude

Keeping categories for a declared pest or prohibited organism

1. *Prohibited Keeping - "Restricted to keeping under the authority of a permit, only at a zoological park, at a scientific organisation approved by the Minister, or for scientific, education or government operational purposes"*

Applicable – extreme threat category species

2. *Restricted Keeping - "Restricted to keeping under the authority of a permit"*

Not applicable

3. *Exempt Keeping - "No permit required for keeping"*

Not applicable

Organism Keeping Category Recommendation:	Prohibited
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Current Status Data

Presence in Australia

Is it Indigenous or Exotic to Australia?

The cane toad is exotic to Australia (ABRS 2013)

Is it present in the wild elsewhere in Australia?

It is present in Australia (ABRS 2013)

Is it legally present elsewhere in Australia?

Occurs elsewhere in Australia (ABRS 2013)

Western Australian Status (Department of Agriculture and Food 2015)

Biosecurity and Agriculture Management Act (2007) and Regulations (2012)

Cane toad (*Rhinella marina*) is a Declared Pest under section 22(2) of the BAM Act (2007).

1. Control Category: C1 Exclusion

Area Declared: Whole of State.

Keeping Category: Prohibited keeping under the BAM Act

Co-ordinating Program Agency: DAFWA

Inspection-Quarantine-Compliance: Import requirements under the *Wildlife Conservation Act 1950* Regulation 19 (Fauna) and 20 (Exotic) Wildlife Conservation Regulations 1970 (Department of Parks and Wildlife 2014).

Inspectorial procedure at the border managed by DAFWA and direction notice to DPaW for verification of species identification.

Assessor: Win Kirkpatrick, Invasive Species, Department of Agriculture and Food, Western Australia. March 2016.

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Consultation draft for SRC only