



## Cane toad (*Bufo marinus*, also *Rhinella marina*)

**Biology and ecology:** The cane toad is native to Central and South America and is a member of the 'true toads' (family *Bufo*)<sup>1</sup>. Cane toads have dry, yellow-brown, warty skin and large distinctive lumps (known as parotoid glands) behind the head. Cane toads naturally generate potent toxins (bufodienolides) throughout their bodies, which act by stopping the heart of most animals that attempt to eat them. These toxins concentrate in glands on the toad's skin, and may be exuded as a milky-white substance if the toad is aggravated or distressed.

Cane toads are relatively long lived and can survive for over 15 years. The average body length of an adult cane toad is 10-15 cm and captive ones can grow up to 2 kg in weight. Cane toads are hardy animals that are able to survive temperatures ranging from 5-37°C<sup>2</sup>. They are active mostly at night, and tend to shelter under leaf litter, rubble or scraps of iron during the day.

**Habitat:** While they prefer moist warm environments, cane toads can survive physiologically stressful conditions (eg droughts). They are nomadic and do not have a defined home range, with most cane toads moving more than 200 m in a single night. They tend to move further in wet seasons on warm, wet and windy nights, but they can remain relatively active even during dry seasons by seeking refuge and foraging in moist areas<sup>3</sup>.

“ Cane toads occupy numerous habitats in Australia, from tropical rainforests and wetlands to semiarid regions ”

Unlike many frog species, which have a waxy layer on their skin, cane toads are not able to prevent water loss caused by evaporation via their skin. Adult cane toads need access to suitable retreat sites during the day for survival, so they must change their location seasonally. During the dry season, they are more likely to use burrows as refugia (and re-use the same ones).

**Nutrition:** Cane toads are highly opportunistic feeders and will eat any animal that they can swallow. But they most frequently consume beetles, ants and termites. Cane toads have also been recorded to eat venomous species such as scorpions, spiders and other toads.



Adult male cane toad. Image: Arnaud Gourret

**Reproduction and lifecycle:** Cane toads return to fresh water (both temporary and permanent) to breed – they prefer to spawn in large, shallow water bodies surrounded by sparse vegetation. Female cane toads over one year old can lay large masses of black eggs (appearing as long strings of jelly) twice a year. There can be up to 30,000 eggs in a single clutch, which are fertilised in the water by a male toad. Thousands of small jet-black tadpoles can be produced from a single mating. In contrast, native frog species tend to lay much smaller clutches and their tadpoles are usually lighter in colour. After a month, tadpoles develop into small toads (about 1-2 cm). All life stages of cane toads (eggs, tadpoles, metamorphs and adults) are poisonous, although toxin types and content vary at each stage. Toxin levels are high in eggs (presenting danger to predators), lower through the tadpole stage, and are lowest during metamorphosis. Toxin levels increase rapidly thereafter, meaning predators of developed toads can be at increased risk of poisoning<sup>2</sup>.

**Biological and behavioural weaknesses:** The cane toad is an amphibian so needs water to live and breed. Cane toad tadpoles also produce pheromones that competitively reduce the growth and survival of other cane toad larvae around them<sup>4</sup>. Native frogs do not respond to these pheromones, so they could potentially be used in cane toad control. Cane toads, like native frog species, are also susceptible to a range of chemicals and pesticides if these come in contact with their skin. In 2011, a toad-control product called HOPSTOP<sup>®</sup> became available in Australia – this uses certain household chemicals sprayed from an aerosol can to humanely kill cane toads.

**Current Australian distribution:** Cane toads were introduced from Hawaii to Gordonvale, northeastern Queensland in 1935 to control beetle pests of sugar cane. They failed to control the beetle, but have since spread throughout more than 1 million km<sup>2</sup> of Queensland, the wet-dry tropics of the Northern Territory and northern New South Wales<sup>1</sup>. In 2009, cane toads crossed the border into Western Australia where they continue to expand west at a rate of 55 km per year. Currently, they are invading the northeast corner of WA including Warmun and Adolphus Island, approaching the Kimberley region. Their potential to invade southern Australia is difficult to predict, but global warming is likely to help the toads to extend their range further south<sup>5</sup>.

**Economic impacts:** Cane toads have no direct impact on agriculture in Australia. Some of the indirect costs of cane toads include potential losses in the tourist trade (due to loss of iconic species) and fisheries (due to poison risk to some fish stocks), but these are difficult to quantify. The most obvious direct costs of cane toads relate to funding research into finding control options, and the field activities of community groups directly targeting the toads.



*Cane toad eating a snake. Image: Crystal Kelehear*

**Ecological impacts:** Cane toads are listed as a 'key threatening process' under Australia's [Environment Protection and Biodiversity Conservation Act 1999](#). They adversely impact native species via predation, competition and poisoning by lethal toxin ingestion<sup>1</sup>. Australian native predators, as well as domestic cats and dogs that have not evolved with cane toads, are highly susceptible to toad poison<sup>1</sup>. Frog-eating snakes and lizards, freshwater crocodiles and northern quolls are most at risk from cane toad poisoning because they are large enough to consume an adult toad, which has high levels of toxin. Some native species (eg planigales and red-bellied black snakes) have developed behavioural and physiological adaptations to cane toads (eg avoiding eating toads)<sup>6</sup>. However, the indirect effect of toads on native biodiversity is relatively unknown.

**Social impacts:** In suburban settings, cane toads are regarded as a nuisance due to their sheer numbers and their poison risk to children and pets. Cane toads can also



*Occurrence of cane toads in Australia. Image: Peter West*

impact the abundance of bush foods, such as goannas, for Indigenous people in remote communities<sup>7</sup>. People often voluntarily kill toads believing it is environmentally responsible even though the ecological benefits of removing toads are unclear. This 'toad busting' may result in the unintentional destruction of native frogs because of people's inability to distinguish native frogs from cane toads. It is recommended to toad bust only in areas where cane toads are known to occur, and to do so under supervision.

“The cane toad is often cited in surveys as Australia's most hated invasive animal”

**Further information:**

1. Shine R (2010). The ecological impact of invasive cane toads (*Bufo marinus*) in Australia. [The Quarterly Review of Biology 85:253-291](#).
2. Urban MC, Phillips BL, Skelly DK and Shine R (2007). The cane toad's (*Chaunus [Bufo] marinus*) increasing ability to invade Australia is revealed by a dynamically updated range model. [Proceedings of the Royal Society of Biological Sciences 274:1413-1419](#).
3. Phillips BL, Brown GP, Greenlees M, Webb JK and Shine R (2007). Rapid expansion of the cane toad (*Bufo marinus*) invasion front in tropical Australia. [Austral Ecology 32:169-176](#).
4. Crossland MR and Shine R (2011). Embryonic exposure to conspecific chemicals suppresses cane toad growth and survival. [Biology Letters, published online before print](#).
5. Caley P, Tennant P and Hood G (2011). [Modelling the Distribution of Vertebrate Pests in New South Wales under Climate Change](#). Invasive Animals Cooperative Research Centre, Canberra.
6. Webb JK, Brown GP, Child T, Greenlees MJ, Phillips BL and Shine R (2008). A native dasyurid predator (common planigale, *Planigale maculata*) rapidly learns to avoid a toxic invader. [Austral Ecology 33:821-829](#).
7. Department of the Environment, Water, Heritage and the Arts (2009). [Australian Government Policy on Cane Toads](#). Australian Government, Canberra.