

PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

Cane toads on the march

Inquiry into controlling the spread of cane toads

House of Representatives Standing Committee on the Environment and
Energy

March 2019
CANBERRA

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Foreword

I am pleased to present this report on controlling the spread of cane toads in Australia.

Cane toads quickly became endemic in Australia following their introduction in 1935 to eradicate the cane beetle. Unfortunately the toads did not combat the beetle, and the hunter has become the hunted. Being both resilient to our conditions and prolific breeders, these toxic toads have caused havoc with native wildlife.

This inquiry provided an opportunity to review and renew efforts to control the spread of cane toads. There is no easy solution. Cane toads are firmly established in Australia and we are unlikely to get rid of them. The best we can do is limit their numbers where they exist, and prevent their spread into places they have not yet invaded.

The recommendations in this report envisage taking immediate practical steps, as well as continuing with research efforts toward larger-scale solutions.

We can take steps to limit and prevent the spread of cane toads onto islands and untouched areas. In particular, there is an opportunity to prevent their invasion further into Western Australia. Cane toads need access to water to survive, and are predicted to advance along a narrow stretch of coast between Broome and Port Hedland. Denying cane toads access to water along this corridor during the dry season could halt their spread. Tanks and troughs used by pastoralists in the area

could be modified. Time is limited – once cane toads progress to Port Hedland, this window of opportunity will close.

Practical measures within local communities are also having an impact on controlling the spread of cane toads. Tadpole trapping, in particular, appears to be an effective option that could be better supported and expanded.

Biological and genetic controls could provide an answer on a large scale over the medium to long term. These are worth investigating through support for ongoing research, subject to taking precautions against risks to other species and the environment.

The Federal Government has a leadership and coordination role in the national efforts to control cane toads, and should accord appropriate priority to it. At the same time, the Federal Government can't do it all alone. State and Territory governments are the key implementing partners for measures to control toads. All levels of government can do better to ensure effective action and coordination.

The Committee held public hearings with scientific experts, community groups and Government departments, gaining valuable insight into current efforts to control cane toads and the newest methods that show promise. On behalf of the Committee, I would like to thank everyone who contributed to the inquiry.

Hon Dr David Gillespie MP

Chair

Contents

Foreword	iii
Members	vii
Terms of Reference	ix
List of Recommendations	xi

The Report

1	Introduction and background	1
	Responses to the cane toad problem	2
	Conduct of the inquiry	8
2	Evidence received	9
	Overview	9
	Control measures	9
	Collecting and removing adult toads.....	9
	Trapping adult cane toads	11
	Trapping cane toad tadpoles.....	12
	Targeting cane toad eggs	15
	Restricting access to water sources.....	16
	Riparian restoration.....	18
	Native predator taste aversion.....	19
	Biological and genetic options	20
	Monitoring and detection	23

Mapping and detecting cane toad populations and distribution.....	23
Species identification.....	24
Preventing new cane toad outbreaks	24
Animal welfare considerations.....	27
Implementation of cane toad control measures	28
Federal cane toad threat abatement plan status and implementation.....	32
3 Committee view and recommendations.....	37
Appendix A. Submissions	43
Appendix B. Public hearings.....	45
Appendix C. Indicative cane toad distribution.....	47

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Terms of Reference

On 28 November 2018, the Committee resolved to inquire into and report on the Department of the Environment and Energy's annual report 2017-18, with particular reference to:

- 1 The effectiveness of control measures to limit the spread of cane toads in Australia.
- 2 Additional support for cane toad population control measures.

List of Recommendations

Recommendation 1

- 3.4 The Committee recommends that the Australian Government contribute funding for the modification of artificial water sources to prevent the spread of cane toads along the northern coast of Western Australia between Broome and Port Hedland; in cooperation with the Western Australian Government, land holders, traditional owners and volunteer groups.

Recommendation 2

- 3.7 The Committee recommends that the Australian Government make funding available to support projects for trapping cane toad tadpoles, including the production of bait, and optimising trap deployment at locations suited to this control method.

Recommendation 3

- 3.9 The Committee recommends that the Australian Government and the State and Territory governments provide support to Indigenous rangers and volunteer groups involved in measures to control cane toads.

Recommendation 4

- 3.11 The Committee recommends that the Australian Government provide additional funding to relevant organisations such as the CSIRO, universities and other bodies for research into suppressing cane toad populations using biological and genetic controls.

Recommendation 5

- 3.14 The Committee recommends that affected State and Territory governments improve internal biosecurity and quarantine measures to protect coastal islands from cane toads.

Recommendation 6

- 3.17 The Committee recommends that in cooperation with affected State and Territory governments, the Department of the Environment and Energy develop a process to monitor whether overall progress is being made to control cane toads.

Recommendation 7

- 3.22 The Committee recommends that the Department of the Environment and Energy, the Department of Agriculture and Water Resources and relevant State and Territory departments ensure that they:
- develop and coordinate plans and strategies to control cane toads;
 - identify priority actions, including:
 - establishing procedures for responding to potential outbreaks of cane toads on islands or at other isolated locations away from the main population;
 - preventing cane toads from spreading into unaffected areas;
 - contribute adequate funding to projects and programs to control cane toads; and
 - publicly report on the progress achieved against the objectives identified in their plans to control cane toads.

Recommendation 8

- 3.25 The Committee recommends that the Department of the Environment and Energy expedite its review of the cane toad threat abatement plan and, as part of this process, take into consideration the measures outlined and recommended in this report.

Recommendation 9

- 3.27 The Committee recommends that prior to the expiry of the next review period of the cane toad threat abatement plan in around 2024, the Australian National Audit Office conduct a performance audit to ascertain whether the Department of the Environment and Energy has fulfilled the plan's requirements and any related statutory obligations.

1. Introduction and background

- 1.1 Since being introduced in Queensland in 1935, cane toads have spread around vast areas of northern Australia.¹ Attempts to contain, suppress or eradicate them on a broad scale have so far been unsuccessful.
- 1.2 Cane toads are generally resilient to adverse environmental conditions – provided the weather is warm and they have access to a suitable water source. Female cane toads can lay between 10,000 and 30,000 eggs in a single clutch and breed on average twice per year.²
- 1.3 Cane toads carry toxins that are often fatal when consumed by native animals, such as goannas, lizards, snakes and quolls. They may also compete with native animals for food and habitation. In areas populated by cane toads, there can be serious impacts on biodiversity and the ecology.³
- 1.4 Some species may benefit or manage to co-exist with cane toads; for example, certain tropical snakes become more common (as there are fewer goannas around to eat the snakes) and some birds, rodents and insects can eat cane toads without being poisoned.⁴

¹ An indicative map showing cane toad distribution can be found in Appendix C.

² CSIRO, *Submission 20*, p. 5; see also Professor Rick Shine, *Submission 1*, p. 3. Professor Shine's submission stated that up to 40,000 eggs could be laid.

³ A number of submissions described cane toad impacts; see for example: Professor Rick Shine, *Submission 1*, p. 2; Professor Mike Letnic, *Submission 5*, p. 1; CSIRO, *Submission 20*, p. 5; Professor Lin Schwarzkopf, *Submission 21*, p. 1; Department of the Environment and Energy, *Submission 23*, pp. 5-6 and attachment A; Ms Lee Scott-Virtue, *Proof Committee Hansard*, 13 February 2019, p. 10.

⁴ Professor Rick Shine, *Submission 1*, p. 2; see also the public hearing discussion on ecological impacts between Professors Shine and Letnic: *Proof Committee Hansard*, 13 February 2019, p. 5.

- 1.5 Economic impacts appear to be uncalculated at this stage. The Committee heard that the cattle industry, lettuce farmers, tourism operators and apiarists could be negatively impacted.⁵ Indigenous people have lost traditional food sources, particularly goannas.⁶
- 1.6 Cane toads at the invasion front are now believed to be capable of moving up to 55 kilometres per year – a much greater distance than previously estimated.⁷

Responses to the cane toad problem

- 1.7 The Federal Government currently regards cane toads as a key threatening process.⁸ The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) states that a process is threatening if it ‘threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community’.⁹ A threat abatement plan may be established in response to a threatening process,¹⁰ which ‘must be reviewed by the Minister at intervals of not longer than five years’.¹¹
- 1.8 A 2011 threat abatement plan for cane toads states that ‘it is not currently possible to contain or eradicate cane toads’ and that a new approach ‘requires national coordination’.¹² The Department of the Environment and Energy advised that the plan is currently being reviewed.¹³

⁵ *Proof Committee Hansard*, 13 February 2019, p. 2.

⁶ Professor Mike Letnic, *Proof Committee Hansard*, 13 February 2019, p. 2; Dr Barry Traill, *Proof Committee Hansard*, 13 February 2019, p. 12.

⁷ CSIRO, *Submission 20*, p. 5.

⁸ Department of the Environment and Energy, *Submission 23*, p. 7.

⁹ *Environment, Protection and Biodiversity Conservation Act 1999* (Cth), s. 188(3).

¹⁰ *Environment, Protection and Biodiversity Conservation Act 1999* (Cth), s. 270A(1).

¹¹ *Environment, Protection and Biodiversity Conservation Act 1999* (Cth), s. 279(1).

¹² Department of Sustainability, Environment, Water Population and Communities, ‘Threat Abatement Plan for the Biological Effects, Including Lethal Ingestion, Caused by Cane Toads’, 2011, p. 1; see <<http://www.environment.gov.au/biodiversity/invasive-species/feral-animals-australia/cane-toads>>.

¹³ Mr Paul Murphy, *Proof Committee Hansard*, 20 February 2019, p. 5.

Cane toad threat abatement plan objectives

The plan has three objectives:

1. Identify priority native species and ecological communities at risk from the impact of cane toads.
2. Reduce the impacts of cane toads on populations of priority native species and ecological communities.
3. Communicate information about cane toads, their impacts and this TAP [threat abatement plan].¹⁴

- 1.9 Ms Kylie Jonasson (Department of the Environment and Energy) said the Australian Government had provided over \$12 million to fund projects related to controlling cane toads. She said funding has recently been provided under the National Environmental Science Program.¹⁵
- 1.10 The Federal Government also has treaty obligations to protect and conserve biodiversity, a responsibility shared with the States and Territories and each jurisdiction has their own regulations for controlling invasive species. Landholders, Indigenous groups, community groups, non-government organisations and businesses also contribute to biodiversity conservation.¹⁶ The cooperation of governments, organisations and individuals is relied upon to progress implementation of threat abatement plans.¹⁷
- 1.11 In addition to cane toads, key threatening processes also include rabbits, foxes, feral cats, feral pigs and escaped garden plants.¹⁸
- 1.12 The Department of the Environment and Energy submitted:
- The Australian Government provides national coordination through overarching strategies and through species specific or site-specific plans. These

¹⁴ Department of Sustainability, Environment, Water Population and Communities, 'Threat Abatement Plan for the Biological Effects, Including Lethal Ingestion, Caused by Cane Toads', 2011, p. 12; see <<http://www.environment.gov.au/biodiversity/invasive-species/feral-animals-australia/cane-toads>>. See also Department of the Environment and Energy, *Submission 23*, p. 8.

¹⁵ Ms Kylie Jonasson, *Proof Committee Hansard*, 20 February 2019, p. 1.

¹⁶ Department of the Environment and Energy, *Submission 23*, p. 4.

¹⁷ Department of the Environment and Energy, *Submission 23*, p. 7.

¹⁸ Further information is available at <<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>>.

strategies and plans allow state, territory and local government, local groups, non-government organisations and landholders to understand how their contribution fits into a broader picture and to provide best practice guidance on how to undertake appropriate management actions.¹⁹

- 1.13 The Department advised that cane toads are subject to the Australian Pest Animal Strategy 2017-2029.²⁰

Australian Pest Animal Strategy – principles for effective pest animal management

1. Prevention and early intervention to avoid the establishment of new pest animal species is generally more cost-effective than ongoing management of established populations.
2. Pest animal management is a shared responsibility between landholders, community, industry and government.
3. Management of mobile pest animals requires a coordinated approach across a range of scales and land tenures.
4. Management of established pest animals should focus on the protection of priority assets (for example, a lambing paddock or a threatened ecological community) but also usually requires a ‘buffer’ management area around the asset to account for pest animal mobility.
5. Pest animal management should be based on actual rather than perceived impacts and should be supported by monitoring to measure whether impact reduction targets are being achieved.
6. Best practice pest animal management balances efficacy, target specificity, safety, humaneness, community perceptions, efficiency, logistics and emergency needs.
7. Best practice pest animal management integrates a range of control techniques (including commercial use where appropriate), considers interactions between species (such as rabbits and foxes) and accounts for seasonal conditions (for example, to take advantage of pest animal congregations during drought) and animal welfare.

¹⁹ Department of the Environment and Energy, *Submission 23*, p. 4.

²⁰ Department of the Environment and Energy, *Submission 23*, pp. 4-5.

8. The cost of pest animal management should be borne by those who create the risk and those who benefit from its management. Governments may co-invest where there is a net public benefit from any such intervention.²¹

- 1.14 The Chief Environmental Biosecurity Officer (based in the Department of Agriculture and Water Resources) provides policy assistance and other support in relation to the environmental impact of foreign pests and diseases.²²
- 1.15 The Western Australian Government has adopted a strategy for mitigating the spread of cane toads,²³ separate to the Federal Government's threat abatement plan.
- 1.16 Key elements from the Western Australian Government's cane toad strategy are provided below.

Western Australia cane toad strategy goals and principles

The strategy's goals are to:

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

From 2014 to 2019, the implementation of this strategy is guided by the following principles:

- a. Research, monitoring and evaluation of cane toad and native fauna distributions, and innovative management approaches are necessary to facilitate improvements in management over time within an active adaptive framework.

²¹ *Australian Pest Animal Strategy 2017-2029*, p. 5; available at <http://www.agriculture.gov.au/pests-diseases-weeds/pest-animals-and-weeds/review-aus-pest-animal-weed-strategy/aus-pest-animal-strategy>.

²² Mr Ian Thompson, *Proof Committee Hansard*, 20 February 2019, p. 2.

²³ Western Australian Government, *Submission 22*, attachment 2; see also <https://www.dpaw.wa.gov.au/management/pests-diseases/cane-toads>.

- b. Taking effective action by using scientific information and best practice techniques to protect native wildlife and environments from cane toads.
- c. Collaborative partnerships are vital, particularly with Traditional owners, to ensure a continued shared commitment to effective cane toad management.
- d. Integration of cane toad management with other land management activities such as the Kimberley Science and Conservation Strategy and the Commonwealth's Cane Toad Threat Abatement Plan (2011).
- e. Public awareness and knowledge of cane toads and their impacts must be continually improved to assist efforts to manage the impact of toads on the natural environment.²⁴

1.17 Cane toads are recognised as a key threatening process in New South Wales.²⁵ The Northern Territory Department of Environment and Natural Resources submitted that cane toads are unable to be managed once established. The Northern Territory Government is now focusing on keeping offshore islands and areas with high conservation values free from cane toads.²⁶ The Queensland Department of Agriculture and Fisheries has assessed cane toads to be an 'extreme' threat species²⁷ and its website advises that 'control of cane toads is not enforced as there is currently no available effective broad scale control'.²⁸ However, as noted in a submission from the Torres Strait Regional Authority, mitigation measures are being

²⁴ Western Australian Government, *Submission 22*, attachment 2; see also <https://www.dpaw.wa.gov.au/images/documents/plants-animals/animals/canetoads/20140470_CaneToadStrategyWA2014-19_FINWEB.pdf>

²⁵ *Biodiversity and Conservation Act 2016* (NSW), Sch. 4.

²⁶ Northern Territory Department of Environment and Natural Resources, *Submission 6*, pp. 2-3.

²⁷ Queensland Department of Agriculture and Fisheries, 'Invasive Animal Risk Assessment: Cane Toad', 2016, attachment 1, at <https://www.daf.qld.gov.au/_data/assets/pdf_file/0014/73112/IPA-Cane-Toad-Risk-Assessment.pdf>.

²⁸ Queensland Department of Agriculture and Fisheries, 'Invasive Animal: Cane Toad', 2016, p. 4, at <https://www.daf.qld.gov.au/_data/assets/pdf_file/0005/77360/IPA-Cane-Toad-PA21.pdf>.

taken to prevent cane toads establishing on islands in far north Queensland.²⁹

- 1.18 Scientists and volunteer groups have also invested their own efforts in controlling cane toads and research on solutions.
- 1.19 Professor Rick Shine observed that while the impact of cane toads is ‘devastating’, this is ‘limited to a small group of species (apex predators) and to a relatively short timescale’.³⁰ He submitted:

...control of toads over large areas where they already occur would have little benefit for biodiversity, and likely is impossible without resorting to methods (e.g., genetic manipulation) whose risks outweigh the benefits.³¹

- 1.20 Professor Shine suggested that controlling cane toads is more likely to be effective for isolated populations, on islands or near the edge of their distribution.³² He added that ‘killing adult cane toads will have no impact if reproduction can continue’.³³ Professor Shine’s submission included a previously published article with further background and analysis of the methods used to control cane toads.³⁴ Professor Mike Letnic made similar observations in his submission:

Despite enormous efforts expended on cane toad control, at best they have only achieved minimal population reduction at small-scales and appear entirely ineffective to limit ongoing invasion across Australia.³⁵

- 1.21 A submission from the Northern Territory Department of Environment and Natural Resources described the challenges of controlling cane toads:

Their high mobility during the rainy season and exceptionally high reproductive output means that they can disperse to and establish in new areas very quickly, often before detection.³⁶

²⁹ Torres Strait Regional Authority, *Submission 19*, p. 1.

³⁰ Professor Rick Shine, *Submission 1*, p. 1.

³¹ Professor Rick Shine, *Submission 1*, p. 1.

³² Professor Rick Shine, *Submission 1*, p. 1.

³³ Professor Rick Shine, *Submission 1*, p. 3.

³⁴ Professor Rick Shine, *Submission 1*, attachment 2, p. 128.

³⁵ Professor Mike Letnic, *Submission 5*, p. 3.

³⁶ Northern Territory Department of Environment and Natural Resources, *Submission 6*, p. 1.

- 1.22 Control methods and further ways to control cane toads are discussed in more detail in the next chapter.

Conduct of the inquiry

- 1.23 The inquiry commenced on 28 November 2018. The Committee initiated the inquiry based on its power to examine the annual reports of government agencies, as determined in a schedule issued by the Speaker.³⁷ The terms of reference can be found in the front pages of the report.
- 1.24 The Committee received 24 submissions and held two public hearings. Witnesses from various locations around Australia gave evidence, either over the phone or in person at roundtable-style public hearings. Details of submissions received and public hearings held can be found in the appendices.
- 1.25 This report relies upon draft transcripts of the public hearings (known as 'proof Committee Hansard'). Errors or omissions are possible and readers are encouraged to check finalised transcripts when they become available on the Committee's website for verification.
- 1.26 The Committee wishes to thank all the individuals and organisations who contributed to the inquiry.

³⁷ House of Representatives Standing Order 215(c).

2. Evidence received

Overview

- 2.1 The Committee received evidence relating to various control measures that are currently used to control cane toads and options in development, including:
- collecting and trapping adult cane toads;
 - trapping cane toad tadpoles;
 - targeting cane toad eggs;
 - restricting cane toad access to water sources;
 - predator taste aversion, to deter them from eating cane toads; and
 - biological and genetic options.
- 2.2 In addition to controlling cane toads in areas already inhabited or infested, the Committee received evidence on the potential for outbreaks away from the main population. The Committee also received evidence on animal welfare considerations and suggestions on forming a strategic approach to implementation of control efforts and where additional support is needed.
- 2.3 Conclusions and recommendations follow in the next chapter.

Control measures

Collecting and removing adult toads

- 2.4 Hand collection (also known as ‘toad busting’) involves people going out at night time to gather cane toads when they are active.¹ This method is most

¹ Biodiversity Watch, *Submission 7*, p. 7; see also Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 1.

suites to open areas where volunteers can easily spot and catch cane toads, rather than forested, remote or hazardous locations.²

2.5 Ms Lee Scott-Virtue (President, Kimberley Toad Busters) said community toad busting ‘absolutely’ slows cane toads and lessens the impacts on native wildlife. She added that this is done in conjunction with other methods, including the use of tadpole traps.³ In addition, Ms Scott-Virtue said that toad busting has social benefits and contributes to community cohesion.⁴

2.6 Biodiversity Watch’s submission outlined some practical considerations in relation to collecting toads:

The method can be deployed in most sites although safety issues can be a concern in areas where there are steep and broken banks, slippery mud and hazards like saltwater crocodiles present. The method can be used to eradicate a site but a significant effort is required to achieve eradication.⁵

2.7 The submission noted that only some cane toads are active each night.⁶ Biodiversity Watch added that shooting cane toads with air rifles equipped with a laser sight is a ‘quick and effective’ method. The submission added that using a repeating air rifle could kill around 230 cane toads per hour and ‘when done correctly the toads are dead instantly’.⁷

2.8 Other evidence suggested toad busting is only effective in certain circumstances and conditions. The Department of the Environment and Energy’s submission observed that there is ‘no evidence that these endeavours prevented the continued spread of the pest or significantly limited its impact on Australia’s biodiversity’.⁸ The submission stated:

Community action, while satisfying... does not have the capacity to make any significant changes to the rate of spread of cane toads or to the densities of cane toads beyond specific local areas. However, where community action is

² Professor Rob Capon, *Submission 8*, p. 3.

³ Ms Lee Scott-Virtue, *Proof Committee Hansard*, 13 February 2019, p. 10; see also Kimberley Toad Busters, *Submission 13*, p. 3; Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 1.

⁴ Ms Lee Scott-Virtue, *Proof Committee Hansard*, 13 February 2019, p. 10.

⁵ Biodiversity Watch, *Submission 7*, p. 7.

⁶ Biodiversity Watch, *Submission 7*, p. 7.

⁷ Biodiversity Watch, *Submission 7*, pp. 9-10.

⁸ Department of the Environment and Energy, *Submission 23*, p. 12.

focused on cane toad management to protect assets at a local scale it could help maintain priority biodiversity assets.⁹

- 2.9 The submission added that manual removal could contribute to maintaining biodiversity on islands inhabited with cane toads.¹⁰
- 2.10 In 2007, Dr Tony Peacock prepared a report for the Western Australian Environment Minister on whether toad busting had been successful. In his submission, Dr Peacock observed that although the report ‘hedged’ on its findings, ‘subsequent information shows that widespread physical removal of toads is pretty useless in most situations’.¹¹
- 2.11 The Town of Port Hedland, while commending the hard work involved in toad-busting, submitted that ‘even with their ongoing efforts, it is highly likely that the toad march will continue on its current course down the Western Australian coast and across the state’.¹²
- 2.12 Professor Rick Shine said that hand collection has ‘a very short-term effect on toad abundances’, unless combined with methods such as tadpole trapping and restricting access to water sources.¹³ He said:
- Simply going out and picking up adult toads may have a role, particularly on the fringes... but I don't think it's sensible to put a lot of effort into it over most of the range of the cane toad.¹⁴
- 2.13 Professor Rob Capon submitted that while toad busting removes tens of thousands of toads each year, ‘cane toads reproduce at an astonishing rate, and with each new generation, toads that fall to toad busters are replaced, and the invasion continues’.¹⁵

Trapping adult cane toads

- 2.14 The Committee received evidence on techniques and devices that can be used to trap adult cane toads. For example, a device called a ‘Toadinator’

⁹ Department of the Environment and Energy, *Submission 23*, p. 12.

¹⁰ Department of the Environment and Energy, *Submission 23*, p. 15.

¹¹ Dr Tony Peacock, *Submission 3*, p. 1; see also Department of the Environment and Energy, *Submission 23*, p. 15.

¹² Town of Port Hedland, *Submission 2*, p. 1.

¹³ Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 2.

¹⁴ Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 2.

¹⁵ Professor Rob Capon, *Submission 8*, p. 3.

uses solar power and produces a sound mimicking a cane toad call as a lure.¹⁶ A submission from Vigilance Technologies noted that machine vision technology could be used in the context of cane toad control.¹⁷

2.15 Biodiversity Watch submitted:

Traps are especially suited to areas where regular visits are not feasible. Traps with appropriate water and shelter systems can be left in the field for long periods as toads live indefinitely in the traps.¹⁸

2.16 A submission from Professor Lin Schwarzkopf explained the advantages of targeting breeding female cane toads with traps:

Traps using an acoustic lure in combination with a food lure target gravid¹⁹ females and remove them from the breeding population before tadpoles appear in the environment, obviating the negative impacts of tadpoles on other tadpoles and fish.²⁰

2.17 Professor Schwarzkopf's submission noted that trapping adult cane toads can be an expensive and time-consuming process. She added that trapped cane toads need to be disposed of humanely.²¹

Trapping cane toad tadpoles

2.18 Tadpole traps can be made from a plastic box with plastic funnels inserted and glued to either side. A chemical attractant – extracted from dead cane toads – is placed in the box and then used to bait the tadpoles into entering the trap.²²

2.19 Professors Capon and Shine worked together on developing the trap. Professor Shine said that a grant from the Australian Research Council led to the discovery of how cane toad tadpoles react to the chemical attractant.²³

¹⁶ Animal Control Technologies Australia, *Submission 9*, p. 2.

¹⁷ Vigilance Technologies, *Submission 12*, p. 1.

¹⁸ Biodiversity Watch, *Submission 7*, p. 7.

¹⁹ A pregnant female cane toad carrying eggs.

²⁰ Professor Lin Schwarzkopf, *Submission 21*, p. 2.

²¹ Professor Lin Schwarzkopf, *Submission 21*, p. 3.

²² Professor Rick Shine, *Submission 1*, pp. 2-3; Professor Rob Capon, *Submission 8*, appendix 2; see also *Ecosure, Submission 15*, pp. 1-2.

²³ Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 3.

- 2.20 A product called 'Bufotab' is currently available to bait cane toad tadpoles.²⁴ Professor Rob Capon submitted:
- ...this chemical can attract many thousands of tadpoles into a funnel trap in only a few hours.... Tadpole trapping is ideally suited for co-implementation with toad busting. Further investment in cane toad chemical ecology could yield additional cane toad population control measures.²⁵
- 2.21 Professor Capon said this example shows the value of utilising cane toad chemical ecology; however, he noted that there is scope to further develop this knowledge.²⁶ He added that frog tadpoles are unaffected, although on occasions fish are found in the traps.²⁷
- 2.22 The Committee received evidence that cane toad trapping can have mixed success and may be open to improvements. Associate Professor Ben Phillips said that cane toad tadpole traps are suitable where water bodies are few in number, whereas in rainy locations it is 'infeasible to put traps in every single pond'.²⁸
- 2.23 Ecosure (an environmental consultancy) submitted that there are both advantages and limitations with cane toad tadpole trapping. While the traps collect large volumes with minimal effort, Ecosure observed that trapping needs to be 'systematic and coordinated and used in concert with other control strategies' to work effectively. Ecosure noted that there is no process for determining where trapping should take place.²⁹
- 2.24 Ecosure also submitted that producing tadpole bait is a 'laborious' process of capture, storage, transport and chemical extraction. The submission suggested that if tadpole trapping is considered essential for control, 'support to develop an artificial bait should be a priority'.³⁰ The submission added:

While [the] attractant bait production process is streamlined, the collection and transport of adult toads is not coordinated and relies on a "handshake

²⁴ Ecosure, *Submission 15*, pp. 1-2.

²⁵ Professor Rob Capon, *Submission 8*, p. 3.

²⁶ Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 2.

²⁷ Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 3.

²⁸ Associate Professor Ben Phillips, *Proof Committee Hansard*, 13 February 2019, p. 4.

²⁹ Ecosure, *Submission 15*, p. 2.

³⁰ Ecosure, *Submission 15*, p. 3.

agreement'' in so far as the attractant bait is provided... as long as glands are supplied.³¹

2.25 Ecosure recommended that 'ongoing research is needed to analyse the success of cane toad tadpole trapping programs at a landscape scale'.³²

2.26 The Clarence Valley Conservation in Action (CVCIA) Landcare Group has experienced 'inconsistent results' with cane toad tadpole traps.³³ The Group submitted:

Traps require more effort to set and check... CVCIA has been involved in trialling different traps and different baits or attractants over the last few years. At times it appears as though toadpoles are avoiding entering traps because the traps have been used. It is quite possible that toadpoles can detect the smell of their own kind from previous trap settings and... avoid entering the trap. More scientific research is needed to refine the effectiveness of toadpole trapping.³⁴

2.27 Professor Lin Schwarzkopf commented that trapping cane toad tadpoles could have unintended outcomes. Her submission explained that trapping could alter the usual internal competition among cane toad tadpoles. She submitted:

Tadpole trapping in the absence of trapping of adult females could, counterintuitively, cause more cane toad juveniles to emerge from a water body than if no tadpole trapping was conducted. ... This could occur because cane toad tadpoles can reach very high numbers in water bodies, and cane toad tadpoles (like many tadpoles) compete most strongly with other cane toad tadpoles, limiting their growth. Thus, trapping tadpoles could have the unintended consequence of not changing, or even increasing, numbers of juveniles emerging from water bodies, because competitive success of cane toad tadpoles is increased if most other cane toad tadpoles are removed.³⁵

2.28 Professor Schwarzkopf added that traps are only suited to accessible locations where they can be closely monitored.³⁶

³¹ Ecosure, *Submission 15*, pp. 1-2.

³² Ecosure, *Submission 15*, p. 3.

³³ Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 4.

³⁴ Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 4.

³⁵ Professor Lin Schwarzkopf, *Submission 21*, p. 2.

³⁶ Professor Lin Schwarzkopf, *Submission 21*, p. 2.

2.29 Professor Capon said that support for tadpole trapping is currently limited and ‘it has proved to be very difficult to get it commercialised’.³⁷ He said:

...I set up an organisation called the Cane Toad Challenge. It runs out of the University of Queensland. It's a citizens science and community engagement initiative. ... We have over 50 organisations signed up now and a further 40 pending sign-off on their forms. They include most of the city and regional councils up the east coast of Australia and many companies and other organisations. We provide them with free baits... They make their own traps and do the trapping, and they report back to us what they got. That is fully funded at the moment by public donations. There is no funding source from any granting agency. It's a shoestring operation, yet it has already galvanised many thousands of members of the public to get involved.³⁸

2.30 Professor Capon said that a supply of pre-designed or pre-prepared traps could optimise their use in the field.³⁹

Targeting cane toad eggs

2.31 The chemical extract used in cane toad tadpole trapping could be used to target eggs laid in water bodies.

2.32 Professor Rick Shine's submission outlined how this works:

...cane toad tadpoles produce chemicals that, if detected by near-hatching eggs, massively decrease rates of survival and growth of the tadpoles that develop from those eggs. Those chemicals have no impact on native amphibians. There is an exciting potential for selective control of cane toads, by preventing recruitment by adding the chemicals to waterbodies.⁴⁰

2.33 Professor Shine noted that this may be easier than attempting to trap cane toad tadpoles, although the method remains experimental and ‘we urgently need expanded trials to assess and fine-tune technology’.⁴¹

2.34 Dr Andrew Sheppard (CSIRO) said that targeting cane toad tadpoles with chemical attractants is ‘highly effective’ in a localised area. He added that the costs could be too high to apply this method more broadly.⁴²

³⁷ Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 3.

³⁸ Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 3.

³⁹ Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 4.

⁴⁰ Professor Rick Shine, *Submission 1*, p. 5.

⁴¹ Professor Rick Shine, *Submission 1*, p. 5.

⁴² Dr Andrew Sheppard, *Proof Committee Hansard*, 20 February 2019, p. 5.

Restricting access to water sources

2.35 In their evidence, Associate Professor Ben Phillips and Dr Barry Trill described how denying access to artificial water sources could prevent cane toads from spreading further into Western Australia. Other submissions also commented on how excluding cane toads from both natural and artificial water sources could impact on their population and distribution.⁴³

2.36 Associate Professor Phillips submitted:

When we combine movement rates with reproductive rates, we can build models of population spread. Such a model has been built with the express aim of investigating potential strategies around the waterless barrier idea.⁴⁴

2.37 His submission explained how this could be applied in Western Australia:

The model clearly shows that, if we do nothing, toads will spread across the waterpoints, between Broome and Port Hedland, and so colonise the Pilbara (an additional 260,000km² of the country). The model also shows that, by creating a “waterless barrier” – a region of country about 70 km wide in which we deny toads access to artificial water – the invasion stops, and the Pilbara remains toad-free. The model assumes that toads are free to move (at maximum rates) through the wet season. During this time, there is abundant water in the landscape and they passively spread into the “waterless barrier”. Come the dry season, however, they require artificial water to persist, and if we deny them this resource across a 70 km stretch of country, all of these dispersing animals will die, and the invasion is driven back to the near edge of the barrier.⁴⁵

2.38 These water sources include tanks and troughs used by pastoralists, which would be modified to be made inaccessible and maintained to avoid any water leaks. Associate Professor Phillips added that if applied in optimal locations, ‘it could be done for as little as \$5 [million] spent on pastoral infrastructure over 50 years’.⁴⁶ Associate Professor Phillips’ submission stated that the implementation is the next step, with the cooperation of

⁴³ Professor Rick Shine, *Submission 1*, p. 3; Biodiversity Watch, *Submission 7*, p. 7.

⁴⁴ Associate Professor Ben Phillips, *Submission 4*, p. 4.

⁴⁵ Associate Professor Ben Phillips, *Submission 4*, p. 4; see also Nyangumarta Warrarn Aboriginal Corporation, Karajarri Traditional Lands Association, Nyangumarta Karajarri Aboriginal Corporation and Pew Charitable Trusts, *Submission 14*, p. 2; Dr Barry Trill, *Proof Committee Hansard*, 13 February 2019, p. 9.

⁴⁶ Associate Professor Ben Phillips, *Submission 4*, p. 5; see also Dr Barry Trill, *Proof Committee Hansard*, 13 February 2019, p. 11.

pastoral lease holders and native title holders.⁴⁷ His submission highlighted that limited time is available:

...the toad invasion front is currently 290 [kilometres] from the top of the possible barrier region. At current rates of spread, this will see them enter the region of interest within 6 years, around 2023. If they raft down the Fitzroy River, which is a very real possibility, they will arrive substantially sooner, even within the next year or two.⁴⁸

2.39 A joint submission from Nyangumarta Warrarn Aboriginal Corporation, Karajarri Traditional Lands Association, Nyangumarta Karajarri Aboriginal Corporation and Pew Charitable Trusts (represented by Dr Barry Traill) supported Associate Professor Phillips' proposal.⁴⁹ The submission added:

We have deep and detailed understanding of this country, and good working relationships with the land owners and managers who live there, both Indigenous and non-Indigenous. We have therefore obvious expertise and local knowledge to assess the viability of delivering the on-ground land management works that could make such a quarantine line successful.⁵⁰

2.40 Associate Professor Phillips said costs had been modelled and shown to represent value for money:

Excluding cane toads from water has had almost no investment at all, even though we've shown it to be very effective. In terms of the maintenance and upgrade of infrastructure, it works out to be about \$100,000 a year to keep toads out of the Pilbara. There are obviously some monitoring costs that haven't been factored into that, in terms of salaries and effort there, but it's astonishingly cheap for a very large impact.⁵¹

2.41 The Western Australian Government submitted that modifying water sources to prevent cane toad dispersal into the Pilbara is being investigated.⁵²

⁴⁷ Associate Professor Ben Phillips, *Submission 4*, p. 5; see also Associate Professor Ben Phillips, *Proof Committee Hansard*, 13 February 2019, p. 7.

⁴⁸ Associate Professor Ben Phillips, *Submission 4*, p. 6.

⁴⁹ NWAC, KTLA, NKAC and Pew Charitable Trusts, *Submission 14*, p. 2.

⁵⁰ NWAC, KTLA, NKAC and Pew Charitable Trusts, *Submission 14*, p. 2.

⁵¹ Associate Professor Ben Phillips, *Proof Committee Hansard*, 13 February 2019, p. 6; see also Associate Professor Ben Phillips, *Submission 4*, p. 5.

⁵² Western Australian Government, *Submission 22*, p. 3.

- 2.42 Professor Rick Shine urged further assessment and field trials. While he agreed that Associate Professor Phillips' proposal 'could bring huge benefits to biodiversity', he cautioned that monsoonal rains may create suitable corridors for cane toad advancement and 'success is by no means assured'.⁵³ The Committee also received evidence of similar techniques being applied in other arid parts of Australia.
- 2.43 Professor Mike Letnic's submission described how restricting water sources has been trialled in the Victoria River District and Tanami Desert in the Northern Territory:
- The presence of human-made dams has allowed cane toads to invade otherwise waterless landscapes... Our research has demonstrated that restricting cane toads' access to water is an effective and practical way to control their populations and reduce their impacts. These findings are significant because most of the area that is left for cane toads to invade in Australia is semi-arid.⁵⁴
- 2.44 Professor Letnic's submission also observed:
- Water exclusion... has great potential to control toad populations in arid areas but is much less effective in higher rainfall regions because in these regions there are many natural sources of water where toads can seek refuge during the dry season. Water exclusion will also require funds to establish and maintain water exclusions and political support to ensure that private stakeholders are on side.⁵⁵
- 2.45 Biodiversity Watch submitted that 'where it is feasible exclusion fencing is the most effective toad removal strategy'.⁵⁶ The submission added that toad busting and trapping adult cane toads becomes more effective when their usual water sources are fenced.⁵⁷

Riparian restoration

- 2.46 Changes to existing water bodies may deter and deny cane toads places to live and breed. Restoration could also encourage native frogs to return.

⁵³ Associate Professor Ben Phillips, *Submission 4*, p. 6; see also Dr Andrew Sheppard, *Proof Committee Hansard*, 20 February 2019, p. 3; Ms Kylie Jonasson, *Proof Committee Hansard*, 20 February 2019, p. 3.

⁵⁴ Professor Mike Letnic, *Submission 5*, p. 6; see also Professor Rick Shine, *Submission 1*, p. 4.

⁵⁵ Professor Mike Letnic, *Submission 5*, p. 9.

⁵⁶ Biodiversity Watch, *Submission 7*, p. 7.

⁵⁷ Biodiversity Watch, *Submission 7*, p. 7 and p. 9.

2.47 Ecosure's submission suggested that restoration activities could include:

- modifying the bank structure to include dense edge plantings, making it harder for cane toads to enter; and
- planting canopy species to create shade, which reduces suitability for cane toad breeding.⁵⁸

2.48 The CSIRO's submission indicated that this method could be further developed:

By studying cane toad breeding habitat selection scientists could develop a better understanding of what makes an ideal cane toad breeding ground, and thus block cane toads from these area or modify the landscape/habitat such that it is no longer suitable for breeding.⁵⁹

Native predator taste aversion

2.49 Cane toads at the invasion front are now estimated to be capable of moving up to 55 kilometres per year – much further than previously estimated.⁶⁰ The Committee received evidence on how native predators could be conditioned not to eat cane toads by exposing them to small quantities of cane toad toxins – enough to induce sickness without causing long-term health problems.⁶¹

2.50 Professor Rick Shine's submission summarised the research on taste aversion:

Field-based trials on the species most vulnerable to toad invasion have shown that predators can coexist with toads if they learn not to eat them. ... Unfortunately, the invasion front is dominated by large adult toads. Research has shown that exposing predators to small toads immediately prior to the arrival of the main toad invasion massively increases resilience of the predators involved, in the case of species such as northern quolls, bluetongue skinks, freshwater crocodiles and floodplain goannas. The offspring of those "educated" predators can survive without further training, because toads are breeding (providing many small "teacher toads") by the time those offspring are born.⁶²

⁵⁸ Ecosure, *Submission 15*, pp. 4-5.

⁵⁹ CSIRO, *Submission 20*, p. 8.

⁶⁰ CSIRO, *Submission 20*, p. 5.

⁶¹ CSIRO, *Submission 20*, p. 8; Western Australian Government, *Submission 22*, pp. 2-3; Department of the Environment and Energy, *Submission 23*, pp. 12-13 and p. 15.

⁶² Professor Rick Shine, *Submission 1*, p. 5.

2.51 The CSIRO's submission commented on the development of this method:

In some circumstances this conditioning has been shown to be effective at increasing the avoidance of some predator species to cane toads. Preliminary field trials... in WA for conditioned taste aversion are ongoing.⁶³

2.52 Professor Shine recommended expanding the taste aversion program, particularly in tropical Western Australia.⁶⁴

2.53 Conversely, Kimberley Toad Busters submitted that taste aversion techniques have limited potential for success, because it does not work for the majority of threatened native species. The submission added that taste aversion has been limited to particular locations, although dispersal of sausage baits could be increased with help from the community.⁶⁵

Biological and genetic options

2.54 During the inquiry, witnesses and submissions discussed the potential benefits and risks of a biological or genetic solution to reduce the cane toad population in Australia on a broad scale.

2.55 Kimberley Toad Busters submitted that 'an effective biological control is critical if we are to stop the... spread of cane toads across Australia'.⁶⁶ The submission recommended more resources for research into a way to modify their DNA (deoxyribonucleic acid) to produce 'daughterless toads'.⁶⁷

2.56 The CSIRO submitted that it had unsuccessfully researched a genetically modified virus, designed to interfere with cane toad tadpoles morphing into adults.⁶⁸ As an alternative, the CSIRO suggested that cane toads could be engineered with reduced reproductive capability, 'by deleting or repressing genes that are critical for fertilization in the cane toad'.⁶⁹ Dr Andrew Sheppard (CSIRO) said that genetic controls may also include developing a cane toad that does not carry toxins.

⁶³ CSIRO, *Submission 20*, p. 8.

⁶⁴ Professor Rick Shine, *Submission 1*, p. 6.

⁶⁵ Kimberley Toad Busters, *Submission 13*, p. 2.

⁶⁶ Kimberley Toad Busters, *Submission 13*, p. 2.

⁶⁷ Kimberley Toad Busters, *Submission 13*, p. 2.

⁶⁸ CSIRO, *Submission 20*, p. 6; see also Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 4.

⁶⁹ CSIRO, *Submission 20*, p. 8.

2.57 The CSIRO further submitted that replacing front line toads with sedentary toads could interrupt the pace of their advance:

The resulting progeny from a “fast” toad and “sedentary” toad mating would in theory spread slower since it would have an equal mix of “fast” and “sedentary” genes. If done on a large scale this could slow the spread of cane toads into new areas.⁷⁰

2.58 Professor Shine said that when introduced, cane toads also brought a unique lungworm from South America, which can be fatal to them, but does not appear to affect native frogs. He also noted the discovery of an amoeba which causes dysentery and eventual cane toad dehydration leading to death.⁷¹ He said:

I think there are all kinds of potential for organisms already within Australia. If we understood a bit more about how they affect toads, perhaps we'd end up with some useful weapons.⁷²

2.59 Dr Sheppard said that an equivalent to the myxomatosis virus (used to control rabbits) had yet to be detected for cane toads, but may be found in future.⁷³

2.60 Professor Mike Letnic also noted that introduced rabbits have persisted in Australia, notwithstanding attempts at biological control, poisoning and physical control:

No single technique has been effective because the efficacy of biological controls has waned over time due to evolution of resistance, the effectiveness of biological controls is dependent on climatic conditions, and much of the country is too remote for poisoning and burrow destruction.⁷⁴

2.61 Professor Letnic submitted:

Techniques such as biological control... have great potential if they can be developed, but they will face technical challenges and legal and ethical issues. Therefore, we should not assume that their development is inevitable and

⁷⁰ CSIRO, *Submission 20*, p. 8.

⁷¹ Professor Rick Shine, *Submission 1*, p. 6; Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 8; see also CSIRO, *Submission 20*, p. 8.

⁷² Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 8.

⁷³ Dr Andrew Sheppard, *Proof Committee Hansard*, 20 February 2019, p. 5.

⁷⁴ Professor Mike Letnic, *Submission 5*, p. 9; see also Professor Mike Letnic, *Proof Committee Hansard*, 13 February 2019, p. 5.

commit funds solely for their development. Such an approach would delay the implementation of other practical methods.⁷⁵

2.62 The Department of the Environment and Energy's submission advised that the time needed to develop a suitable genetic or viral solution may eventuate too late – as cane toads 'may have reached the full extent of their likely range regardless of the investment made'.⁷⁶

2.63 Professor Shine highlighted the possible risks:

Even if the technology were feasible, the dangers of releasing a self-disseminating GMO [a genetically modified organism] would be difficult to justify given the minor ecological impact of cane toads in areas where they have already been present for several years. Not only is there a risk of transfer to other amphibian species, but also the risk that any genetic manipulation would find its way to the native range of the cane toad (and related toad taxa) where it could cause catastrophic collapse of an important subset of the world's amphibians.⁷⁷

2.64 The CSIRO emphasised that its research is in 'very early stages' and noted the potential controversy, risks and public acceptability issues.⁷⁸ Dr Sheppard said:

...what we're doing on cane toads is very much under containment... We're not doing anything in terms of trying to manage populations at this stage, which is considered – both nationally and internationally – as still quite controversial.⁷⁹

2.65 Kimberley Toad Busters opposed releasing small toads ahead of the invasion front, submitting that smaller toads are adept at climbing and hiding. The submission added that these toads also consume large amounts of food and reach breeding size in a few months.⁸⁰

⁷⁵ Professor Mike Letnic, *Submission 5*, p. 9.

⁷⁶ Department of the Environment and Energy, *Submission 23*, p. 13.

⁷⁷ Professor Rick Shine, *Submission 1*, p. 4; Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 5; see also Frog Safe Inc, *Submission 24*, p. 5.

⁷⁸ Dr Andrew Sheppard, *Proof Committee Hansard*, 20 February 2019, p. 5.

⁷⁹ Dr Andrew Sheppard, *Proof Committee Hansard*, 20 February 2019, p. 7; see also CSIRO, *Submission 20*, p. 9.

⁸⁰ Kimberley Toad Busters, *Submission 13*, p. 2.

Monitoring and detection

Mapping and detecting cane toad populations and distribution

- 2.66 As cane toads continue to extend their range, Ecosure suggested that population distribution information should be kept updated.⁸¹ Ecosure noted that the Department of the Environment and Energy's latest published cane toad distribution map is dated 2008. The Department of the Environment and Energy's submission included a map dated 2019, which can be found in Appendix C of this report.⁸²
- 2.67 A submission from the Australian Museum Research Institute described how a mobile phone application called 'FrogID' collects data and recordings of frog calls, which allows for frog species to be logged and mapped. The submission suggested that cane toad calls could be similarly tracked, allowing the presence of cane toads and changes to frog populations to be monitored.⁸³ The Institute's submission stated:
- The early detection of invasive species in new areas increases chances that the population can be controlled and better understanding the distribution and impact of invasive species contributes towards their effective management.⁸⁴
- 2.68 Associate Professor Ben Phillips commented that climate change means that it is 'very difficult to work out... the possible range of the toad'.⁸⁵
- 2.69 A submission from Frog Safe Inc discussed the ongoing decline of frog and cane toad populations in northern Queensland, around Cairns and Mission Beach. The submission described 'rampant' hatching failures of both frog and cane toad eggs in water sources downstream from residential suburbs. Frog Safe Inc suspected this trend is linked to the presence of a household chemical.⁸⁶

⁸¹ Ecosure, *Submission 15*, pp. 2-3.

⁸² Department of the Environment and Energy, *Submission 23*, attachment B.

⁸³ Australian Museum Research Institute, *Submission 17*, p. 1; see also Mr Ian Thompson, *Proof Committee Hansard*, 20 February 2019, p. 6.

⁸⁴ Australian Museum Research Institute, *Submission 17*, p. 1.

⁸⁵ Associate Professor Ben Phillips, *Proof Committee Hansard*, 13 February 2019, pp. 7-8.

⁸⁶ Frog Safe Inc, *Submission 24*, pp. 2-3.

Species identification

- 2.70 The Committee received evidence that native frogs may be occasionally killed if mistaken for a cane toad. Similarly, frog tadpoles can be easily mistaken or misidentified.⁸⁷
- 2.71 Clarence Valley Conservation in Action Landcare Group submitted that ‘effective control of any pest species relies heavily on correct identification to ensure non-target species are not adversely impacted by control efforts’.⁸⁸ The submission added:
- The sighting of a cane toad in Canberra in late 2018 provides a poignant example of this need for good identification as in the aftermath of the toad sighting there were reports of many native frogs being harmed as community members thought they were dealing with cane toads.⁸⁹
- 2.72 The Town of Port Hedland noted cases of mistaken identity and recommended public education on species identification.⁹⁰

Preventing new cane toad outbreaks

- 2.73 The Committee received evidence on instances of cane toad outbreaks and colonies establishing separate to the main population.
- 2.74 For example, cane toads have established on Thursday Island and Horn Island in the Torres Strait and have been detected nearby on Prince of Wales Island and Hammond Island. Cane toads have been captured or found dead on other islands in the Torres Strait.⁹¹
- 2.75 Professor Rick Shine’s submission noted that an outbreak population had occurred in a Sydney industrial estate, after cane toads arrived on trucks. They were eradicated using a combination of hand collection, fencing around breeding sites and tadpole trapping.⁹²

⁸⁷ Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 1.

⁸⁸ Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 1.

⁸⁹ Clarence Valley Conservation in Action Landcare Group, *Submission 18*, p. 1; see also <<https://www.environment.act.gov.au/parks-conservation/plants-and-animals/Biosecurity/pest-animals/cane-toads>>

⁹⁰ Town of Port Hedland, *Submission 2*, p. 2.

⁹¹ Torres Strait Regional Authority, *Submission 19*, p. 1.

⁹² Professor Rick Shine, *Submission 1*, p. 4.

2.76 Similarly, cane toads have been found in the vicinity of Port Hedland, having arrived as hitchhikers.⁹³

2.77 The Northern Territory Department of Environment and Natural Resources noted in its submission:

Cane toads can establish satellite populations considerable distances ahead of the main invasion front through flood dispersal or by hitching rides on vehicles. Detection and eradication of hitchhiker toads and small satellite populations may slow down the rate of spread at the invasion front. However, unless individual cane toads are detected at new locations before they reproduce, it is virtually impossible to eradicate them.⁹⁴

2.78 The Northern Territory Department's submission described how seawater barriers, quarantine, fencing port facilities, sniffer dogs, visual checks and surveillance had assisted with keeping its offshore islands free from cane toads, particularly Groote Eylandt.⁹⁵ The Department's submission added:

To date capacity has been limited to establish similarly adequate fit-for-purpose measures for other offshore islands in northern Australia. Consequently the risk of establishment on some high conservation value islands remains high. Presently the biggest risk to island establishment is commercial shipping, air and freight transport from the mainland to islands. Presently the level of quarantine undertaken at ports or on craft is largely at the discretion of operators.⁹⁶

2.79 A submission from the Torres Strait Regional Authority described taking similar actions to the Northern Territory Government to keep islands free from cane toads. The Authority proposed further biosecurity and mitigation measures:

The TSRA is therefore requesting the Committee support... the following initiatives, in order of urgency:

- Engagement with major transport providers to outline their General Biosecurity Obligations under the *Biosecurity Act 2014*.
- Development of a monitoring strategy to prevent biosecurity risks to the region.

⁹³ Town of Port Hedland, *Submission 2*, p. 1.

⁹⁴ Northern Territory Department of Environment and Natural Resources, *Submission 6*, p. 1.

⁹⁵ Northern Territory Department of Environment and Natural Resources, *Submission 6*, p. 2.

⁹⁶ Northern Territory Department of Environment and Natural Resources, *Submission 6*, p. 3.

- An assessment of priority pests and their entry pathways.
- Development of quarantine procedures, particularly for freight, throughout the region.
- Development and implementation of a biosecurity plan to mitigate the threat of cane toads in the region.⁹⁷

2.80 A submission from Steve Austin Conservation Canines recounted how dogs have been trained (and fitted with locator collars) to detect cane toads and deployed to Moreton Island in Queensland. The submission noted the importance of early detection:

Once a cane toad starts to breed they are quite difficult to eradicate... The key is to determine the tipping point of the cane toads foothold as by the time you see two or three cane toads, it may be too late as there are probably already hundreds there.⁹⁸

2.81 The submission added that dogs can be used to confirm whether an area is clear of cane toads. They can also assist with quarantine measures, such as checking vehicles and cargo storage.⁹⁹

2.82 The Department of the Environment and Energy's submission noted the potential for cane toad colonies to establish and the importance of early detection:

Biosecurity protocols are also required to prevent transport of cane toads to islands in cargo, including in particular in soil and building products. Education of travellers can prevent long-distance hitch-hiking cane toads from establishing in new environments. Flushing of animals in floodwaters or direct swimming to closer islands is also responsible for some colonisation events.¹⁰⁰

2.83 Mr Ian Thompson (Department of Agriculture and Water Resources) said that there is a quarantine strategy for northern Australia.¹⁰¹ He said Indigenous ranger groups are employed on a fee-for-service basis to conduct surveillance and report incursions of certain pest species.¹⁰²

⁹⁷ Torres Strait Regional Authority, *Submission 19*, p. 2.

⁹⁸ Steve Austin Conservation Canines, *Submission 16*, p. 2.

⁹⁹ Steve Austin Conservation Canines, *Submission 16*, p. 3.

¹⁰⁰ Department of the Environment and Energy, *Submission 23*, p. 14.

¹⁰¹ See <<http://www.agriculture.gov.au/biosecurity/australia/naqs>>

¹⁰² Mr Ian Thompson, *Proof Committee Hansard*, 20 February 2019, p. 4.

Animal welfare considerations

2.84 A submission from RSPCA Australia noted that while a ‘justification for cane toad control is accepted’,¹⁰³ cane toads are ‘sentient animals and their welfare must be considered’.¹⁰⁴ RSPCA Australia submitted:

To be consistent with the principles of humane vertebrate pest management, methods must achieve a humane death which is defined as, “when an animal is either killed instantly or rendered insensible until death ensues, without pain, suffering or distress”.¹⁰⁵

2.85 RSPCA Australia’s submission stated that while ‘it is recognised that lethal methods need to be available to remove young and adult cane toads’ there is also ‘conflicting advice regarding the most effective and humane options’.¹⁰⁶ The submission noted the risks associated with methods of killing cane toads, which included:

- Blunt trauma (such as by hitting cane toads with golf clubs and bats) is ‘likely to result in pain and suffering for the toad’, unless it is done correctly.
- Chemical agents may not kill toads properly or they could hop away after being exposed. Chemical sprays ‘if used according to label directions... are considered relatively humane’.
- Use of gaseous agents (CO₂) needs a strict adherence to standard operating procedures to ensure humaneness.
- Refrigeration followed by freezing is likely to be a humane method; however, ‘further review is recommended to assess humaneness’.
- Traps pose ‘significant welfare risks’ unless they are frequently monitored and operators ‘must be able to kill any captured toads humanely’.
- Fencing water sources ‘appears to be innocuous’ but toads are left to die from dehydration.
- There are lesser risks associated with eliminating cane toad tadpoles or the eggs.

¹⁰³ RSPCA Australia, *Submission 10*, p. 3.

¹⁰⁴ RSPCA Australia, *Submission 10*, p. 4.

¹⁰⁵ RSPCA Australia, *Submission 10*, p. 4.

¹⁰⁶ RSPCA Australia, *Submission 10*, p. 6.

- RSPCA Australia cautioned against the use of biological controls, because this induces disease that may be followed by prolonged pain and suffering.¹⁰⁷
- 2.86 RSPCA Australia's submission added that potential impacts on non-target species need to be considered. After a cane toad has died, other animals could eat the carcass, absorb the toxins and suffer a painful death.¹⁰⁸
- 2.87 RSPCA Australia recommended that animal welfare should be given due consideration when developing control options:
- It is imperative that any new methods being developed are also assessed in terms of animal welfare and that this is also made a requirement by the Australian Pesticides and Veterinary Medicines Authority (APVMA) for product registration. Where government funding is used for research and development into potential new methods, RSPCA Australia urges that appropriate welfare criteria are developed and assessed as a condition of support.¹⁰⁹
- 2.88 Ecosure noted that cooling and then freezing adult cane toads appears humane, but this remains subject to confirmation. Currently, there is no specific methodology for euthanising cane toad tadpoles. Ecosure recommended allocating resources to reviewing cane toad adult and tadpole euthanasia methods, particularly cooling and freezing. The submission suggested that preferred methods should be published.¹¹⁰

Implementation of cane toad control measures

- 2.89 Evidence received suggested that complete eradication of cane toads in Australia is unlikely. Witnesses and submissions observed that strategies to control cane toads should utilise multiple methods suited to local conditions.
- 2.90 More generally, as discussed in the sections above, the evidence received discussed where additional resourcing and improved coordination could be beneficial, such as for more trials, testing, research, refinement and implementation of control measures.

¹⁰⁷ RSPCA Australia, *Submission 10*, pp. 4-6; see also Frog Safe Inc, *Submission 24*, pp. 4-5.

¹⁰⁸ RSPCA Australia, *Submission 10*, p. 6.

¹⁰⁹ RSPCA Australia, *Submission 10*, p. 4.

¹¹⁰ Ecosure, *Submission 15*, p. 4; see also Steve Austin Conservation Canines, *Submission 16*, p. 3.

2.91 Professor Shine said that ‘guesswork’ had guided past efforts to control cane toads. He said that notwithstanding extensive information being available to determine effect control methods, there is a ‘disconnect between the researchers and the general community’.¹¹¹ Professor Shine added:

There are still resources being put into methods that we know are not effective. I just think we need to somehow get the message out and to base continuing expenditure of effort on the methods that can be shown, with evidence, to be effective.¹¹²

2.92 Professor Mike Letnic said that with the emphasis on finding a ‘silver bullet’ solution, such as a biological control, options such as barriers around water sources had been to some extent ignored. He said that methods vary in effectiveness depending on the location and characteristics of cane toad habitat.¹¹³

2.93 Animal Control Technologies Australia submitted that ‘total eradication should not be the goal but thoughtful and strategic management to acceptable levels of damage or localised eradication would be realistic targets’.¹¹⁴

2.94 Similarly, Professor Lin Schwarzkopf submitted:

Realistically, eradication of toads in Australia is unlikely, no matter the method, and most proposed control measures are likely to provide suppression of numbers. ... It will be necessary to use a variety of measures to control toads, and I recommend an integrated control approach, using a variety of methods.¹¹⁵

2.95 Professor Mike Letnic said options that work well in arid areas may not achieve the same results in the wet tropics.¹¹⁶ Professor Letnic submitted:

Looking forwards, the effective control of cane toad populations will require an integrated approach that relies on having more than one method available and funds to implement control programs across a range of land tenures.¹¹⁷

¹¹¹ Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 1.

¹¹² Professor Rick Shine, *Proof Committee Hansard*, 13 February 2019, p. 1.

¹¹³ Professor Mike Letnic, *Proof Committee Hansard*, 13 February 2019, p.1.

¹¹⁴ Animal Control Technologies Australia, *Submission 9*, p. 2.

¹¹⁵ Professor Lin Schwarzkopf, *Submission 21*, p. 1.

¹¹⁶ Professor Mike Letnic, *Proof Committee Hansard*, 13 February 2019, p. 3; see also Mr Graeme Sawyer, *Proof Committee Hansard*, 13 February 2019, p. 10.

2.96 In his submission, Professor Rick Shine agreed that the control method needs to match the situation. He observed:

...local conditions of weather and topography (and attributes of the toads themselves, which differ strongly between populations in eastern versus western Australia) strongly affect the efficiency of alternative methods for toad control. Experimental studies in eastern Queensland recorded high capture rates in traps, but studies in drier parts of Australia have reported very low rates of capture (and worrying levels of bycatch of native fauna).¹¹⁸

2.97 Professor Schwarzkopf observed that most methods for controlling cane toads are relatively new and 'require more support for testing and implementation'.¹¹⁹

2.98 Professor Rob Capon submitted that efforts should be directed both at the invasion front and within areas already invaded:

While the invasion front is undoubtedly an area for concern, it is critical that we not ignore the cane toad invaded regions of Australia that trail behind the front, and reach back across the continent to the east coast of Australia (i.e., Qld and northern NSW).¹²⁰

2.99 Professor Capon submitted that disrupting the cane toad reproductive cycle should be the area of focus.¹²¹ He submitted that existing methods involving cane toad tadpole trapping and toad busting are less than ideal. He concluded that a lasting solution needs 'entirely new cane toad control measures'.¹²²

2.100 Professor Capon suggested a range of short-term practical steps that could improve existing control efforts:

- Accessible advice (on a website, mobile app or help line) regarding 'where, when and how to bust and trap' and information about cane toad life stages, from egg to adult.

¹¹⁷ Professor Mike Letnic, *Submission 5*, p. 1; see also Ecosure, *Submission 15*, p. 5.

¹¹⁸ Professor Rick Shine, *Submission 1*, p. 4.

¹¹⁹ Professor Lin Schwarzkopf, *Submission 21*, p. 2.

¹²⁰ Professor Rob Capon, *Submission 8*, p. 3; Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 2.

¹²¹ Professor Rob Capon, *Submission 8*, p. 4.

¹²² Professor Rob Capon, *Submission 8*, p. 4.

- Advice on humane euthanasia, safe handling and disposal and data acquisition.
- Supply of cane toad tadpole baits.
- Government investment in professional support staff to work with volunteer groups.¹²³

2.101 Furthermore, Professor Capon proposed a ‘significant, stable, multi-year funding of a multidisciplinary team of researchers’ to research cane toad chemical ecology. His submission stated that ‘chemical ecology has already delivered cane toad tadpole trapping... imagine what could be achieved with a strategic commitment to funding and support’.¹²⁴

2.102 Dr Andrew Sheppard (CSIRO) said:

...there are potential technologies becoming available that, in the medium to long and perhaps very long term, have the potential to be a game changer for managing widespread established invasive species. So, while there is nothing at the moment, we're investing resources in exploring some of those opportunities for the long term.¹²⁵

2.103 Professor Capon added that supporting cane toad eradication should consider the bigger picture:

It's about coordinating the various processes, whether it's toad busting, trapping or fencing off areas.... It's doing it in a coordinated fashion and in an informed fashion. Where the public gets involved, it's about making sure that they—and even government agencies—are properly advised on best practice.¹²⁶

2.104 As discussed earlier in this chapter, Associate Professor Ben Phillips and Dr Barry Traill recommended restricting access to water sources in Western Australia to prevent cane toads venturing into the rest of the State. Dr Traill said:

Active Indigenous ranger groups are on the ground, willing and available to help. We'd certainly take a very active interest and would help promote and

¹²³ Professor Rob Capon, *Submission 8*, p. 4.

¹²⁴ Professor Rob Capon, *Submission 8*, p. 4.

¹²⁵ Dr Andrew Sheppard, *Proof Committee Hansard*, 20 February 2019, p. 4.

¹²⁶ Professor Rob Capon, *Proof Committee Hansard*, 13 February 2019, p. 4.

drive the issue. So, with a modest investment, we think we can stop the toads from extending down into Western Australia, across a huge tract of country.¹²⁷

2.105 The Town of Port Hedland recommended that governments consider making grants available to volunteer groups involved in cane toad eradication.¹²⁸

2.106 Kimberley Toad Busters recommended:

- With careful administration, paying a bounty for toads collected.
- Making toad busting part of ‘work for the dole’ arrangements.
- Offering visa extensions to overseas visitors who assist with toad busting.
- Providing small grants for toad busting volunteer groups.
- Providing designated places for cane toad disposal.
- Releasing a major national cane toad awareness educational program.¹²⁹

Federal cane toad threat abatement plan status and implementation

2.107 As discussed in Chapter 1, a threat abatement plan¹³⁰ was developed in 2011, within the framework of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). The Department of the Environment and Energy advised that the plan is currently being reviewed.¹³¹

2.108 Mr Graeme Sawyer said that the Federal Government has ‘completely dropped the ball’ on cane toads and ‘effectively withdrew any coordination function and funding out of the toad issue quite some time ago’.¹³²

2.109 Biodiversity Watch’s submission also criticised current government efforts to control cane toads:

...governments, especially the federal government, have ceased funding efforts to understand the impacts of cane toads and the need for control and

¹²⁷ Dr Barry Traill, *Proof Committee Hansard*, 13 February 2019, p. 9.

¹²⁸ Town of Port Hedland, *Submission 2*, p. 1.

¹²⁹ Kimberley Toad Busters, *Submission 13*, p. 4.

¹³⁰ The plan is available at <<http://www.environment.gov.au/biodiversity/invasive-species/feral-animals-australia/cane-toads>>.

¹³¹ Mr Paul Murphy, *Proof Committee Hansard*, 20 February 2019, p. 5.

¹³² Mr Graeme Sawyer, *Proof Committee Hansard*, 13 February 2019, p. 10.

this has led to a situation where the impacts of cane toads in places like Kakadu and other areas has been ignored and wildlife devastation covered up.¹³³

2.110 Ms Lee Scott-Virtue said that the Western Australian Government has downgraded the cane toad pest status and that its support, 'while good in the past, has completely gone'.¹³⁴

2.111 The Western Australian Department of Biodiversity, Conservation and Attractions participated in a review of the cane toad threat abatement plan. The Western Australian Government submitted:

The plan provides a workable overarching policy direction for cane toad management across jurisdictions; however, resourcing for implementation of the plan is required to improve coordination, and the effective and efficient application of knowledge already gained across relevant states and territories.¹³⁵

2.112 The Department of the Environment and Energy advised that the threat abatement plan does not refer to the option of restricting cane toad access to water sources.¹³⁶ The Department further advised that funding for a project restricting cane toads from artificial water sources in Western Australia may be available within the Regional Land Partnerships Program. Mr Paul Murphy (Department of the Environment and Energy) said that 'whether such a project could attract funding through that program is an open question. It really depends how it was put together'.¹³⁷ The Department undertook to provide further advice on how much money is currently unallocated within the Program.

2.113 The Committee also notes recent evidence on threat abatement planning Mr Murphy provided to a Senate committee inquiry on faunal extinction:

The threat abatement plans are documents that outline national priorities for management and research. The making of a threat abatement plan doesn't come with specific funding to implement the plan. To progress actions within threat abatement plans the department relies on partnerships and co-

¹³³ Biodiversity Watch, *Submission 7*, p. 2; see also Mr Graeme Sawyer, *Proof Committee Hansard*, 13 February 2019, p. 10.

¹³⁴ Ms Lee Scott-Virtue, *Proof Committee Hansard*, 13 February 2019, p. 10.

¹³⁵ Western Australian Government, *Submission 22*, p. 3.

¹³⁶ Ms Kylie Jonasson, *Proof Committee Hansard*, 20 February 2019, p. 5.

¹³⁷ Mr Paul Murphy, *Proof Committee Hansard*, 20 February 2019, p. 2.

investments with other government agencies, industries and stakeholders. Of course they are also pursued through Landcare and the like. So funding is attracted to priorities that are outlined in the threat abatement plans.¹³⁸

2.114 The Department is also not involved in cane toad tadpole trapping programs.¹³⁹

2.115 In relation to the plan more generally, Ms Kylie Jonasson (Department of the Environment and Energy) said:

...the most effective thing would be a mosaic of approaches. Community awareness and information is one of those. Investing in the science is another.... The threat abatement plan's a public document and... our review will bring more up-to-date information and be available and we can disseminate and work that with the states and territories.¹⁴⁰

2.116 Mr Ian Thompson (Department of Agriculture and Water Resources) said that responsibilities are shared:

Biosecurity is a shared responsibility between the Commonwealth, the states, industry and community. ... For established pests within Australia, and ones that have been here for quite a long time, it is primarily up to the states. ...the Commonwealth can play a role in coordination; it'll do things to protect Commonwealth assets. Research always has a place there, but for things like cane toads we would expect the states to be taking significant action where they can.¹⁴¹

2.117 Ms Jonasson added that the Western Australian Government's cane toad strategy may provide relevant insights and experience.¹⁴²

2.118 Mr Thompson noted that the cane toad is not the only threat requiring an investment of resources, citing:

...the Asian black-spined toad, which is also poisonous and has all the bad attributes of the cane toad except for one worse attribute: it can live in cooler

¹³⁸ Mr Paul Murphy, *Proof Committee Hansard*, 14 February 2019, Senate Environment and Communications References Committee (inquiry into Australia's faunal extinction crisis), p. 29.

¹³⁹ Mr Paul Murphy, *Proof Committee Hansard*, 20 February 2019, p. 5.

¹⁴⁰ Ms Kylie Jonasson, *Proof Committee Hansard*, 20 February 2019, p. 6.

¹⁴¹ Mr Ian Thompson, *Proof Committee Hansard*, 20 February 2019, p. 4.

¹⁴² Ms Kylie Jonasson, *Proof Committee Hansard*, 20 February 2019, p. 7.

temperatures, and it regularly hitchhikes or stows away on containers, ships and trucks coming from South-East Asia.¹⁴³

2.119 Mr Thompson said that in terms of allocation of resources, 'we've got to take into account where's the best investment—putting more money into something that's here and is very difficult to control or stopping something that could be just as bad'.¹⁴⁴

¹⁴³ Mr Ian Thompson, *Proof Committee Hansard*, 20 February 2019, p. 6.

¹⁴⁴ Mr Ian Thompson, *Proof Committee Hansard*, 20 February 2019, p. 6.

3. Committee view and recommendations

- 3.1 The inquiry process has made it clear to the Committee that there does not appear to be an immediate solution that could safely and effectively eradicate cane toads from Australia, particularly in places where fresh water is generally available. We cannot undo their introduction to Australia or completely eradicate them. However, the Committee received evidence on a range of practical measures that could slow their spread and disrupt cane toad populations.
- 3.2 As discussed in the previous chapter, there are many control methods and avenues of potential research into how to control cane toads. The viability of each option begins with research and field experiments and, once an option becomes viable, there is a clear responsibility for government agencies to assist with implementation, coordination and monitoring the results. Private sector investment could be encouraged.
- 3.3 The Committee considers that there is an urgent and important opportunity to prevent cane toads from spreading further into Western Australia, by restricting their access to artificial water sources along the narrow corridor of coastline between Broome and Port Hedland (as described in chapter 2). This same approach has potential application in other arid areas, where strategic water sources could be modified or fenced to exclude cane toads. This could prevent them from spreading, given that without access to water cane toads succumb to dehydration.

Recommendation 1

- 3.4 The Committee recommends that the Australian Government contribute funding for the modification of artificial water sources to prevent the spread of cane toads along the northern coast of Western Australia between Broome and Port Hedland; in cooperation with the Western Australian Government, land holders, traditional owners and volunteer groups.**
- 3.5 The Committee heard evidence about the effectiveness of community efforts to trap and collect cane toads in areas across Australia where they are already present. The Committee acknowledges evidence that trapping adult toads is effective in limited circumstances and when combined with other methods, such as trapping their tadpoles and excluding them from breeding sites. Cane toads reproduce quickly and can travel vast distances relative to their size. Trapping devices that target fertile adult females could assist with disrupting cane toad populations.
- 3.6 The Committee supports trapping cane toad tadpoles. Refinement of this process may be needed, to avoid the potential for any unintended outcomes.

Recommendation 2

- 3.7 The Committee recommends that the Australian Government make funding available to support projects for trapping cane toad tadpoles, including the production of bait, and optimising trap deployment at locations suited to this control method.**
- 3.8 The Committee commends the valuable role played by Indigenous rangers and volunteer groups across Australia in implementing measures to control the spread of cane toads, including those above. The local knowledge and ready workforce offered by these groups is a significant asset. The Committee believes that they warrant recognition and support as allies and implementing partners of governments in controlling the spread of cane toads.

Recommendation 3

- 3.9 The Committee recommends that the Australian Government and the State and Territory governments provide support to Indigenous rangers and volunteer groups involved in measures to control cane toads.**

- 3.10 Biological or genetic controls could offer eventual solutions on a larger scale than current efforts to control toad populations can achieve. The CSIRO drew attention to the potential for genetic controls to be developed, such as reducing cane toad toxicity or interfering with reproduction. The Committee acknowledges that there are potential risks associated with these types of measures, which need to be carefully assessed and managed. However, the Committee supports continued research into biological and genetic controls, which have the potential to be game-changing in the fight against cane toads.

Recommendation 4

- 3.11 The Committee recommends that the Australian Government provide additional funding to relevant organisations such as the CSIRO, universities and other bodies for research into suppressing cane toad populations using biological and genetic controls.**

- 3.12 Cane toads have the potential to establish away from their main population. There was once an outbreak in Sydney and islands in northern Australia are at risk. Cane toads have reached some Torres Strait islands. There is continued need for biosecurity, quarantine and early detection. In particular, the Committee urges State and Territory governments to focus adequate attention and resources on ensuring that cane toads do not reach our islands.

- 3.13 For example, sniffer dogs have been operating successfully in south east Queensland and this approach could be replicated.

Recommendation 5

- 3.14 The Committee recommends that affected State and Territory governments improve internal biosecurity and quarantine measures to protect coastal islands from cane toads.**

- 3.15 The Committee agrees that existing approaches (together with emerging control methods) need to be factored into comprehensive strategic planning, which should be adjusted to local conditions as new research findings become available.

- 3.16 Cane toads are among many pests already in Australia and there are limited resources. Taking a strategic approach is important to ensure available resources are effectively and efficiently utilised. The Committee supports continued investigation of long-term solutions.

Recommendation 6

- 3.17 The Committee recommends that in cooperation with affected State and Territory governments, the Department of the Environment and Energy develop a process to monitor whether overall progress is being made to control cane toads.**
- 3.18 The Committee is concerned about views suggesting that the Federal, State and Territory governments may not be according sufficient priority to strategy, coordination and support for controlling the spread of cane toads.
- 3.19 On balance, evidence received suggests that until recently, limited resources have been invested in the cane toad problem. The Department of the Environment and Energy could not clearly articulate how much funding is available or the projects currently being supported.
- 3.20 The Queensland and New South Wales governments did not lodge submissions to the inquiry. The absence of submissions from these governments stands in contrast to submissions received from the Northern Territory and Western Australian governments and, in particular, the WA Government's efforts to implement its cane toad strategy.
- 3.21 The Committee is of the strong view that controlling the spread and impact of cane toads is of national significance, requiring commitment from the Commonwealth and the affected State and Territory governments. To that end, we urge all governments, including Queensland and New South Wales, to accord priority to addressing the threat posed by the spread of cane toads.

Recommendation 7

- 3.22 The Committee recommends that the Department of the Environment and Energy, the Department of Agriculture and Water Resources and relevant State and Territory departments ensure that they:**
- **develop and coordinate plans and strategies to control cane toads;**
 - **identify priority actions, including:**
 - **establishing procedures for responding to potential outbreaks of cane toads on islands or at other isolated locations away from the main population;**
 - **preventing cane toads from spreading into unaffected areas;**

- **contribute adequate funding to projects and programs to control cane toads; and**
- **publicly report on the progress achieved against the objectives identified in their plans to control cane toads.**

3.23 While responsibilities are shared with the States and Territories, the Federal Department of the Environment and Energy has a leadership and coordination role.

3.24 The Department is currently reviewing the national cane toad threat abatement plan. In addition to support for the measures recommended above, issues that the Department could examine and incorporate into an updated national cane toad threat abatement plan include:

- Identifying locations where cane toad control is both feasible and necessary for conserving biodiversity, based on analysis of how the effectiveness of available control techniques correspond with particular geographic conditions.
- Assessing the costs, benefits and risks arising from options available to control adult cane toads, cane toad tadpoles or cane toad eggs, with a view to determining where resources should be invested. This could include traps that specifically target fertile female cane toads likely to be bearing eggs.
- Establishing a process to coordinate cane toad control efforts among governments, research institutions, Indigenous communities and volunteer groups.
- Issuing advice and updating the cane toad threat abatement plan when substantive new research and scientific evidence becomes available.
- Improving public awareness, by providing information on matters including:
 - Safe handling and cane toad disposal.
 - Correct species identification.
 - Riparian modifications to encourage frogs and deter cane toad habitation.
- Maintaining and making available maps and information on cane toad distribution in Australia.
- Using a mobile phone application for volunteers to collect data on frog and cane toad distribution and prevalence.

Recommendation 8

- 3.25 The Committee recommends that the Department of the Environment and Energy expedite its review of the cane toad threat abatement plan and, as part of this process, take into consideration the measures outlined and recommended in this report.**
- 3.26 It is of concern to the Committee that the Department did not appear to take adequate notice of emerging control solutions and has allowed its threat abatement planning to become out of date. The Committee concludes that an external audit may be warranted in due course to evaluate progress.

Recommendation 9

- 3.27 The Committee recommends that prior to the expiry of the next review period of the cane toad threat abatement plan in around 2024, the Australian National Audit Office conduct a performance audit to ascertain whether the Department of the Environment and Energy has fulfilled the plan's requirements and any related statutory obligations.**

Hon Dr David Gillespie MP

Chair

25 March 2019

A. Submissions

- 1 Professor Richard Shine
 - Attachment 1
 - Attachment 2
 - Attachment 3
 - Attachment 4
- 2 Town of Port Hedland
- 3 Dr Tony Peacock
 - Attachment 1
- 4 Associate Professor Ben Phillips
- 5 Professor Mike Letnic
- 6 Northern Territory Department of Environment and Natural Resources
- 7 Biodiversity Watch
- 8 Professor Rob Capon
- 9 Animal Control Technologies Australia
- 10 RSPCA Australia
- 11 Mr Melville Miranda
- 12 Vigilance Technologies
- 13 Kimberley Toad Busters
- 14 Nyangumarta Warrarn Aboriginal Corporation, Karajarri Traditional Lands Association, Nyangumarta Karajarri Aboriginal Corporation and Pew Charitable Trusts
- 15 Ecosure

- 16 Steve Austin Conservation Canines
- 17 Australian Museum Research Institute
- 18 Clarence Valley Conservation in Action Landcare Group
- 19 Torres Strait Regional Authority
- 20 Commonwealth Scientific and Industrial Research Organisation
- 21 Professor Lin Schwarzkopf
- 22 Western Australian Government
 - Attachment 1
 - Attachment 2
- 23 Department of the Environment and Energy
 - Attachment 1
- 24 Frog Safe Inc

B. Public hearings

Wednesday, 13 February 2019 - Canberra

Professor Rick Shine, private capacity

Associate Professor Ben Phillips, private capacity

Professor Mike Letnic, private capacity

Professor Rob Capon, private capacity

Kimberley Toad Busters

- Ms Lee Scott-Virtue, President

Biodiversity Watch

- Mr Graeme Sawyer

The Pew Charitable Trusts

- Dr Barry Traill, Director - Outback to Oceans Program

Wednesday, 20 February 2019 - Canberra

Department of the Environment and Energy

- Ms Kylie Jonasson, First Assistant Secretary
- Mr Paul Murphy, Assistant Secretary, Wildlife Trade and Biosecurity Branch

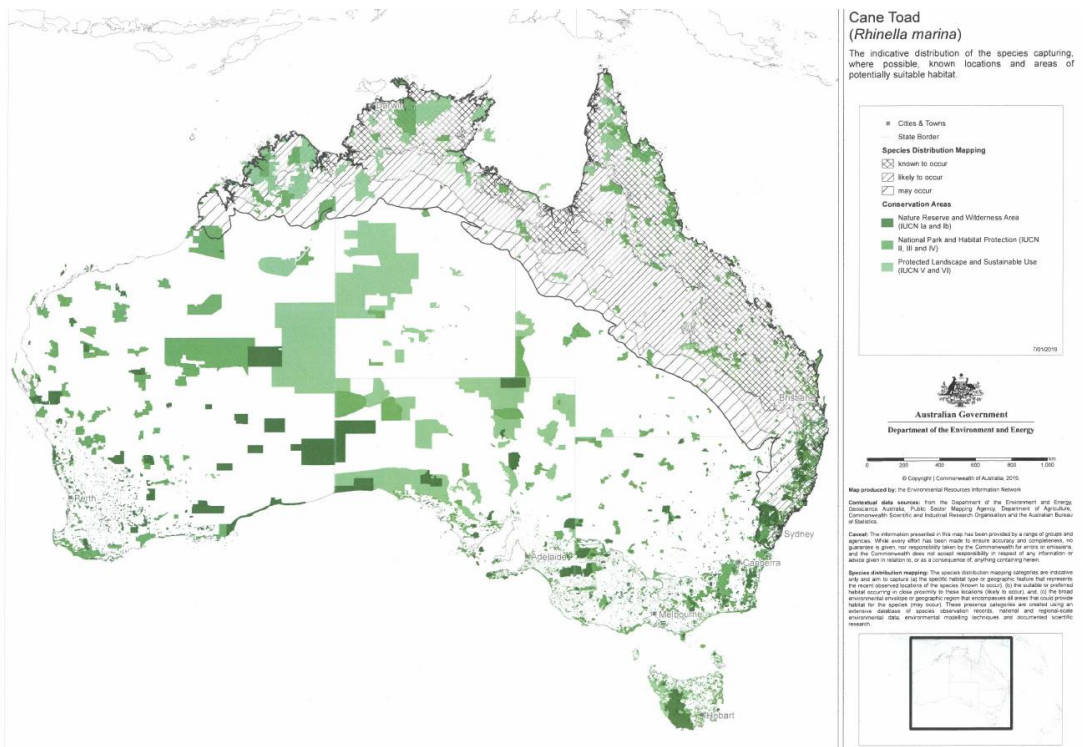
Department of Agriculture and Water Resources

- Mr Ian Thompson, Chief Environmental Biosecurity Officer
- Ms Shalan Scholfield, Director, Established Pest Animals and Weeds

Commonwealth Scientific and Industrial Research Organisation

- Dr Andrew Sheppard, Research Director

C. Indicative cane toad distribution



Source: Department of the Environment and Energy, Submission 23, attachment B.