



Australian Government
Bureau of Rural Sciences

Cane Toads in Communities

Executive Report

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1. Introduction

1.1. Project background and context

The cane toad *Bufo marinus* was introduced to Gordonvale in Queensland in 1935 in an attempt to control the cane beetle. Since then, the cane toad has proven a successful invader of Australian ecosystems, with recent reports indicating that cane toads have now crossed into Western Australia. Prior to the arrival of cane toads in Kakadu in 2001, there had been few extensive environmental monitoring studies. However, evidence suggests that many species, including quolls, various reptiles and other species are highly susceptible in areas where large numbers of cane toads are found (van Dam et al. 2002).

Despite well-publicised community responses to the threat of cane toads in Western Australia, there have been few socio-cultural impact studies. For example, in the ‘Attitudinal Survey on Vertebrate Pest Management in Victoria’ (Department of Natural Resources and Environment 1997) 33 out of 353 respondents listed the cane toad when asked about animal species classified as pests. A more recent study—‘Attitudes Towards Invasive Animals’ (ValueMetrics Australia, Invasive Animals CRC, 2007)—noted that urban residents listed cane toads as a lesser concern relative to other invasive species and that local Aboriginal people’s perceptions of cane toads (as part of an assessment of the risks of the animal to Kakadu National Park) was essentially an acceptance of the presence of cane toads.

This study was commissioned by the Department of Environment, Water, Heritage and the Arts (DEWHA) in March 2009. The research investigated northern Australian communities’ perception of cane toad threat, impact and management. The primary objectives of the project were to:

1. identify key themes in community motivations and perception of the threat, impact and management of cane toads, including identification of any notable temporal or geographic differences in perception
2. identify key themes across demographic and cultural differences in northern communities.

1.2. Report structure

This executive report covers the content of the PowerPoint presentation delivered to the Threatened Species Scientific Committee on 4 June 2009. It also provides some demographic themes that were not included in the original PowerPoint. The document is a synopsis of key findings and does not elaborate or specify details of the research process. The report is structured in four key parts:

- summary of findings
- brief discussion of methods used
- key themes on perception of threats, impacts and management, including any notable differences by location, and other emerging themes
- demographic points of interest.

2. Summary of findings

Key themes for community perceptions of threats, impact and management of cane toads, including relevant geographic and temporal themes

- People were more aware of the habits and characteristics of cane toads in areas of long-term cohabitation (Cairns, Kowanyama) than in areas where the arrival of cane toads is more recent or yet to occur (Darwin, Kununurra, Broome).
- People had noticed wildlife adapting to cane toads, particularly those with more frequent access to the natural environment such as the participants in the conservation focus groups.
- People become more accepting of cane toads as length of cohabitation increases, i.e. more comments were made inferring acceptance or indifference to cane toads in the eastern case studies (Cairns, Kowanyama), and more negative comments were made about cane toads in the western case studies (Kununurra, Broome).
- The negative perception of cane toads was strongest in areas where they have not arrived (Kununurra and Broome).
- Around 90 per cent of responses made by participants regarding the threats and impacts of cane toads were negative.
- People were most concerned about the threat and impacts of cane toads on wildlife and the environment in general.
- There were more responses made by participants regarding the impact of cane toads on reptiles than to any other animal taxa.
- Concern for domestic pets was the theme referenced most frequently with respect to impact on humans or lifestyle.
- The arrival of cane toads has had a major impact on the community of Ngukurr due to its reliance on impacted species, such as goannas, for bush tucker.
- People identified severe limitations to current management around cane toads, including manual collection methods, but still feel it is important to 'do something positive'.
- Despite the limitations, there was hope that eradication will be made possible through research into a biological control or similar technology.
- There was a high degree of participation in, and awareness of, individual and community based cane toad control practices.
- Ideas about cane toad management methods were more numerous than suggestions about management responsibility, but respondents generally felt that the community has a role to play in cane toad management.
- Community members expressed the view that there is no consistent message about the impacts or management of cane toads in Australia.
- The community is eager for accurate information about cane toads.
- The media played a key role in shaping the perception of the cane toad threat.

Demographic themes

- Indigenous people and males were generally more accepting of cane toads than non-indigenous people and females.

- Indigenous people displayed more concern around impacts on aquatic species, snakes and goannas than non-indigenous people. This was often expressed with reference to a decline in bush tucker.
- Non-indigenous people displayed more concern about general negative impacts on wildlife and the environment, frogs, and domestic pets than indigenous people.
- Males were more concerned about bush tucker, reptiles and the environment in general, and females were more concerned about frogs and domestic pets.
- Females were more likely to mention animal welfare issues and non-violent control methods such as manual collection, while males were more likely to mention methods such as clubbing or hitting and research for cane toad management strategies.
- Non-indigenous people, males and middle-aged people were more likely to mention limitations to management than indigenous people, females, youth or elderly people.

Implications of the research

The research findings raise many questions for those working on research, communication and policy development regarding cane toads. Some of the key questions emerging for those working in the cane toad arena include:

- Given that levels of concern around the threat posed by cane toads decreases with length of time of cohabitation and it is likely that western communities will adjust to living with cane toads over time, what intervention, if any, is required to manage cane toads in Western Australia?
- Given that the negative impact on bush tucker was acutely expressed, is there a need for specific intervention in remote indigenous communities recently or yet to be impacted by cane toads?
- Given the high levels of community awareness regarding the limitations of current cane toad management strategies in achieving population level control, including the inefficiency of manual collection, what policy response is suggested at the community level?
- Given that the community expressed a high level of hope for a biological solution, and an independent review commissioned by DEWHA indicated that there is no clear prospect in the next few years of an agent to stop the spread of toads or to reliably and significantly reduce their numbers where they are established, is there a need for specific communication to the community around this issue?
- Given the high level of community interest in cane toad management and the commitment to shared responsibility of cane toad management, are there opportunities to involve the community in:
 - monitoring activities
 - ecological literacy activities
 - on-ground activities to protect high value assets?
- Given the community concern around inhumane killing of cane toads, what research and communication is necessary around this issue?
- Given the range and number of questions the community asked, what kind of consistent messages about the threat that cane toads pose need to be developed and how could they be conveyed?

- Given the demographic differences expressed in perception of the threats, impact and management of cane toads, is it appropriate for messages around cane toads to be communicated to different people in different ways?

3. Methods

The qualitative research drew primarily on semi-structured interviews and focus group interviews with community members in six case study sites across northern Australia. Two focus groups were held in each location: one with people that held employment or were actively volunteering in activities associated with conservation or cane toad management; and one with other community members. Secondary data and interviews with key informants were used to inform the research design, through identification of key contacts and areas for investigation. Secondary data and key informant interviews were also used to help validate emerging themes.

Qualitative research is designed to answer why/how questions to provide rich data in terms of what people say about an issue or topic (response). The challenge in qualitative analysis lies in making sense of the vast number of responses, which entails reducing the volume of raw data to themes and identifying significant patterns (Patton, 2002). Unlike surveys where data is routinely analysed by respondent, qualitative research reports by response. Numbers of responses are reported here given the primary audience (policy makers) necessitates that findings are presented concisely, and to report otherwise would require extensive textual explanations.

The semi-structured interviews and focus group interviews were conducted from late March until mid-May 2009 across six different case study sites (Figure 1). Case study sites were selected to include a range of different periods of cane toad occupation. Efforts were also made to ensure some spread of age, gender and indiginity in interview participants.

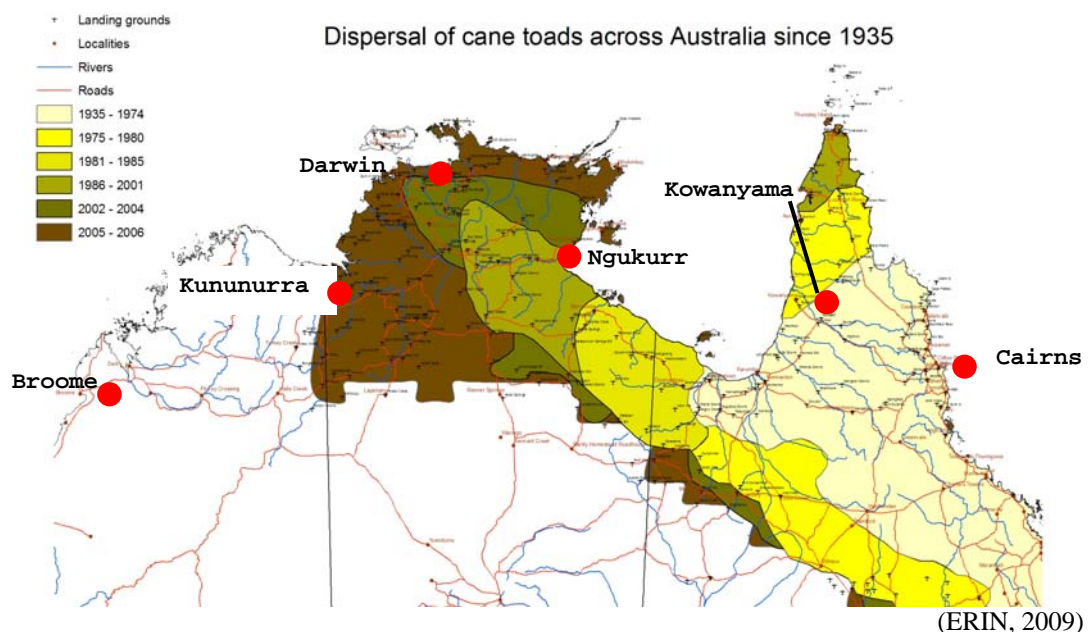


Figure 1. Cane toad dispersal since 1935 and case study sites in northern Australia

Following the interviews, all key informant interview notes, focus group notes and interview transcripts were analysed using ‘NVivo’—a software package that facilitates the analysis of qualitative interview data. ‘NVivo’ is a valuable tool for

organising large amounts of qualitative data and validating themes identified during data collection. As prefaced above, findings were recorded according to responses (number of times a theme was mentioned) not respondents (number of people that mentioned a theme).

There are always more responses than respondents, given that one person may comment more than once to a specific question. For the demographic and attitudinal themes, the responses were normalised by number of respondents, to provide a basis for comparative graphs. Only responses from interviewees assigned a value at each attribute were included. Responses were not included from focus groups or interviews where attribute information (gender, age, indigeneity) was unavailable.

To allow a comparison of response rates between the groups of different sizes, a 'normalised comparative response rate' was calculated for each theme and attribute group as follows:

Normalised comparative response rate =

(Number of responses from an attribute group divided by number of interviewees in that attribute group) multiplied by 100

For example: if there were 109 non-indigenous interviewees and they made 50 responses at theme x, the normalised comparative response rate would be:

$$(50/109) * 100 = 45.9$$

Please note that a normalised comparative response rate can exceed 100 because interviewees can express multiple responses to the same question indicating greater engagement or interest.

Figure 2 provides an overview of the research design and Table 1 provides the numbers of participants in the focus groups and interviews.

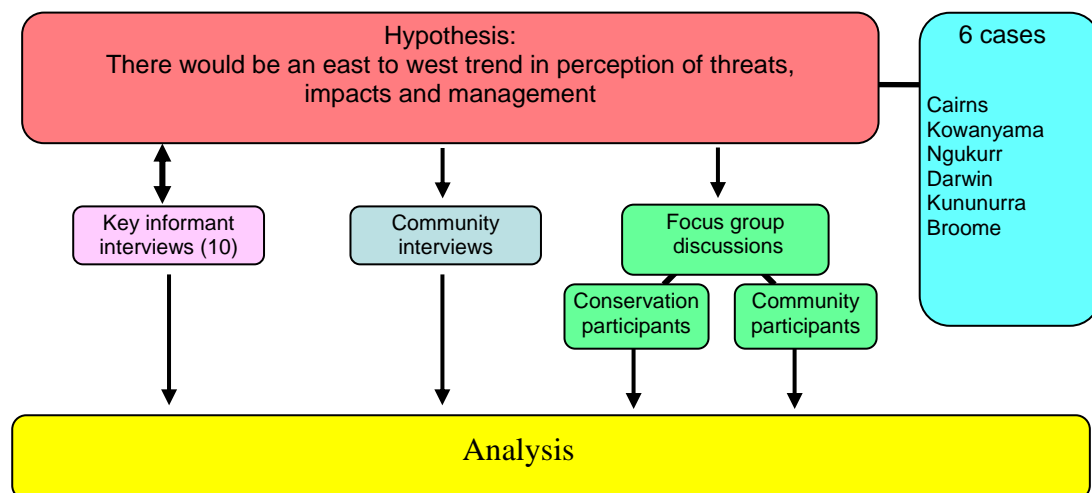


Figure 2. Research design for cane toads in communities

Table 1. Interview and focus group participation

	Number of participants*						
	Cairns	Kowanyama	Ngukurr	Darwin	Kununurra	Broome	Total
Interviews	37	23	28	31	39	31	189
Conservation Focus Group	8	9	7	7	12	8	51
Other Community Focus Groups	6	10	5	5	13	6	45

*Note – some interviews were conducted with multiple participants

The key questions asked during the interviews and focus groups followed a semi-structured format and reflected the overarching research questions. These were as follows:

- What have you noticed about cane toads?
- How do you feel about cane toads?

What could/should be done about managing cane toads?

4. Key themes

4.1. What people noticed about cane toads

Summary Box

Findings

- People were more aware of the habits and characteristics of cane toads in areas of long-term cohabitation (Cairns, Kowanyama) than in areas where the arrival of cane toads is more recent or yet to occur (Darwin, Kununurra, Broome).
- People had noticed wildlife adapting to cane toads, particularly those with more frequent access to the natural environment such as the participants in the conservation focus groups.

Implications

- There is anecdotal evidence of some species of wildlife adapting to the presence of cane toads.

There were 750 responses relating to interviewees' descriptions of cane toads including cane toad characteristics, aesthetics, numbers and range, habits and lifestyle, and how wildlife were responding to cane toads in the environment. Over one-third of these responses described toad characteristics such as habits, size and fecundity. Another third related to beliefs about cane toad population size and geographical range.

There were geographical differences in response rates about cane toad characteristics, with interviewees in the most eastern locations having comparatively higher response rates than interviewees from the other locations. This correlates with the longevity of individuals' experiences of cane toads.

Kowanyama interviewees had the highest comparative response rate for descriptions of wildlife adaptations to cane toads. Responses were generally about birds learning

to flip toads over, but there were also stories about wildlife populations recovering in the local areas. Responses from participants in the conservation focus groups also frequently referred to wildlife adaptations. There were more comments discussing wildlife adaptations in certain locations, or in certain groups: this appears to be associated with more frequent contact with the natural environment.

4.2. Attitudes towards cane toads

Summary Box

Findings

- People become more accepting of cane toads as length of cohabitation increases, i.e. more comments were made inferring acceptance or indifference to cane toads in the eastern case studies (Cairns, Kowanyama), and more negative comments were made about cane toads in the western case studies (Kununurra, Broome)
- The negative perception of cane toads was strongest in areas where they have not arrived (Kununurra and Broome).

Implications

- Given levels of concern around the threat posed by cane toads decreases with length of time of cohabitation and it is likely that western communities will adjust to living with cane toads over time, what intervention, if any, is required to manage cane toads in Western Australia?

There were 268 responses relating to attitudes towards cane toads. Around two-thirds of responses (155) inferred a negative perception of and attitude towards cane toads, including feelings of dislike, hatred or anger towards the presence of cane toads. More than one-quarter (73) of attitude responses reflected a positive, accepting or indifferent attitude to cane toads.

Interviewees in different locations had different patterns of attitudinal responses. Those in the west were more likely to respond with attitudes of dislike or hatred against toads, as depicted in Figure 3. Those in the east offered more responses reflecting an acceptance or indifference towards cane toads compared with those in the west (Figure 4).

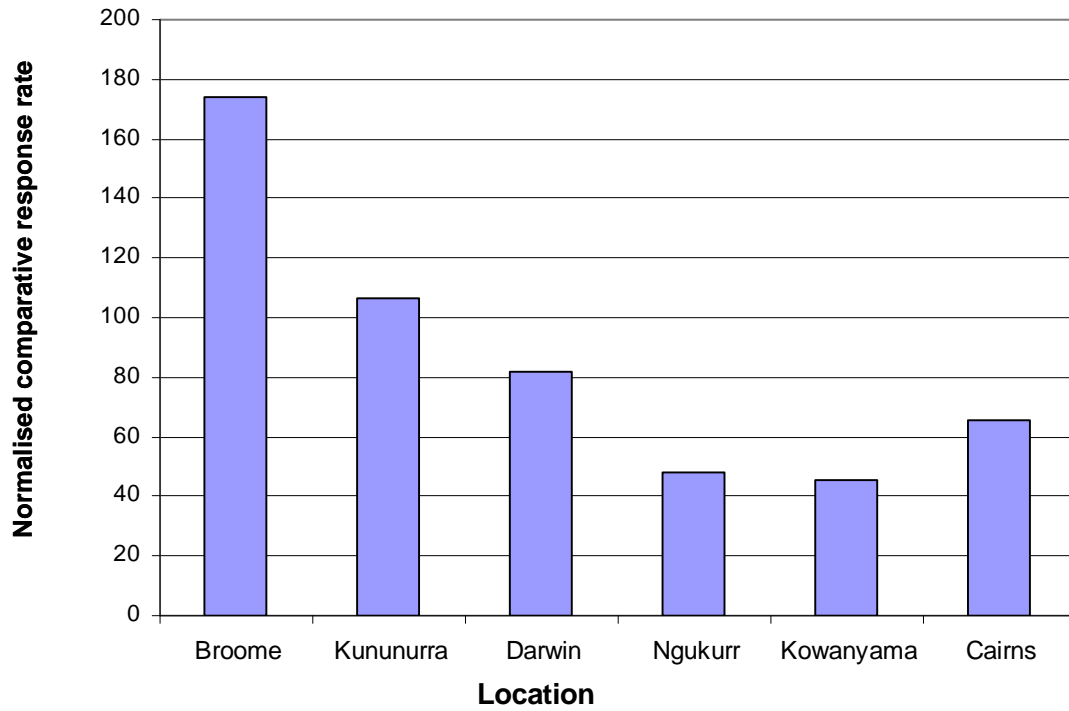


Figure 3. Negative attitude towards cane toads: distribution of responses (N=155)

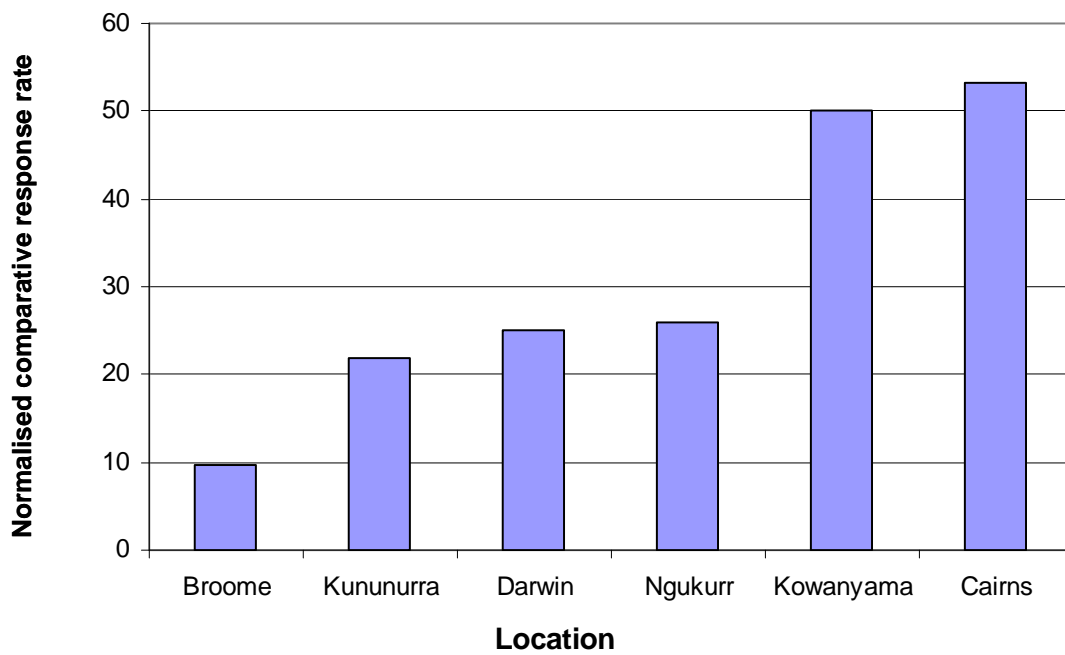


Figure 4. Indifference or acceptance: distribution of responses (N=73)

4.3. Perceived threats and impacts

Summary Box

Findings

- The majority of perceptions about cane toad threats and impacts were negative, and the most references were made to wildlife and environmental threats.
- There were more references to the impact on reptiles than to any other animal species.
- Concern for domestic pets was the theme referenced most frequently with respect to impact on humans or lifestyle.
- The arrival of cane toads has had a major impact on the community of Ngukurr due to its reliance on impacted species, such as goannas, for bush tucker.

Implications

- Given that the negative impact on bush tucker was acutely expressed, is there a need for specific intervention in remote indigenous communities recently or yet to be impacted by cane toads?

There were 1081 responses relating to the perceived threats and impacts posed by cane toads. Respondents mentioned a range of threats and impacts believed to be associated with cane toad arrival and occupation. Around 90 per cent of responses described negative impacts. Seven per cent of responses described a minimal impacts or uncertainty about the impacts, and a further three per cent of responses indicated they believed there were positive impacts. Responses regarding threats and impacts posed by cane toads are summarised in Figure 5.

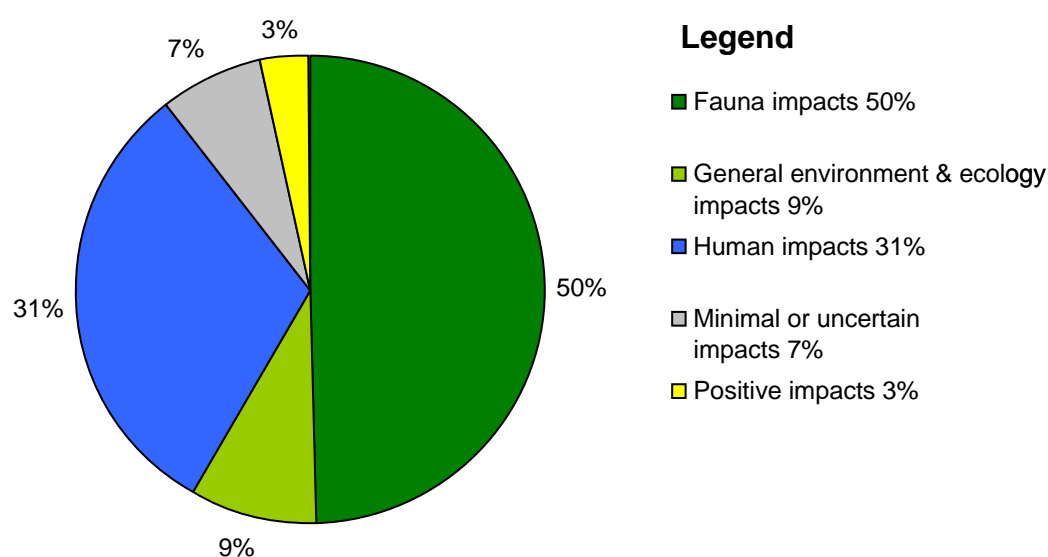


Figure 5. Perceived threats and impacts (N=1081)

4.3.1. Negative impacts and threats

Overall, the number of responses on negative threats and impacts varied between locations, with participants in Kununurra expressing the most concern about negative impacts (200/1081). Participants in Kununurra and Broome also mentioned certain key threats and impacts such as non-specific environmental and non-specific wildlife threats more frequently. Kununurra also had the highest number of comments around economic impacts, mainly due to concerns about threats to the tourism industry caused by loss of iconic wildlife species.

Impacts on fauna

Over half of all negative threats and impacts related specifically to fauna (Figure 6).

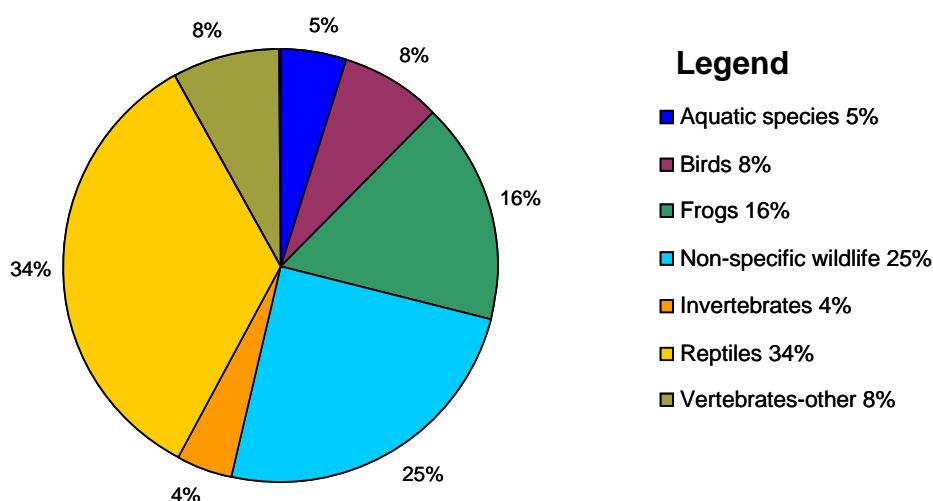


Figure 6. Perceived threats and impacts on fauna (N=534)

Reptiles, in particular goannas, were mentioned most frequently under threats to fauna. The concerns around goannas were mentioned most frequently in Ngukurr, followed by Darwin. A species of particular concern to Ngukurr community members was the sand goanna, which is an important bush tucker species. Concern for frogs was mentioned more frequently in Cairns than any other location.

Impacts on people

The key perceived threats and impacts on people were fear for the safety of domestic pets, concern around impacts on lifestyle, and concern around the loss of bush tucker (Figure 7).

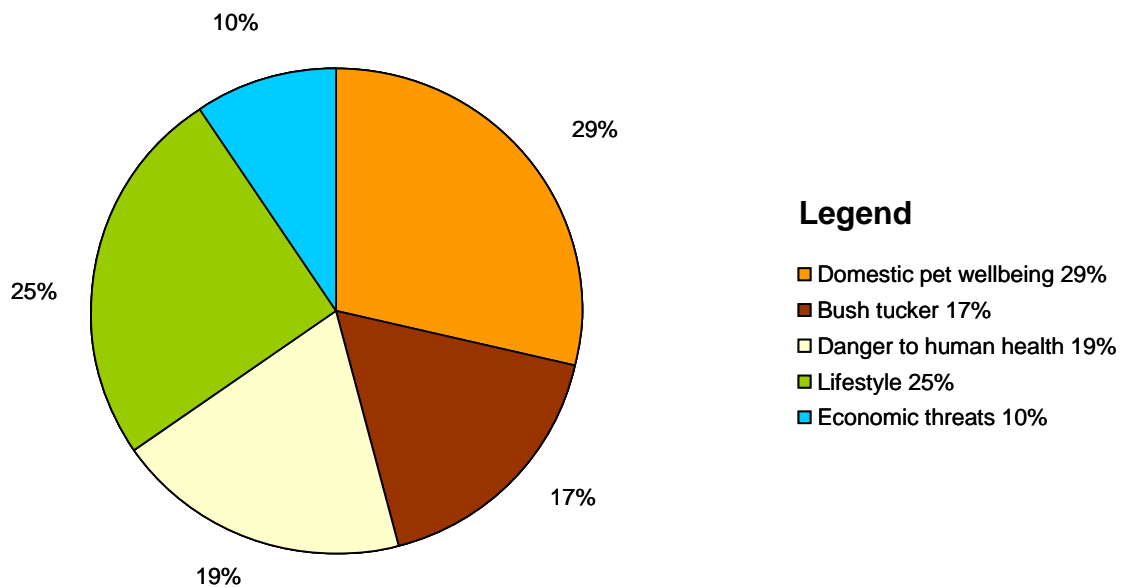


Figure 7. Perceived threats and impacts for people (N=335)

Concern for domestic pets was the key perceived impact for people and was cited most frequently in the urban centres of Cairns and Darwin, followed by Kununurra. However, despite the relative frequency of concern for pets, only one respondent mentioned a pet having been killed by eating a cane toad and many people mentioned that they had learned how to treat their pets when exposed to cane toad toxins.

Concern around impacts on lifestyle included the loss of enjoyment of the bush and the nuisance factor of having cane toads in public and private amenity areas. The impact on public and private amenities was mentioned most frequently in Cairns and Ngukurr, and attachment to bush lifestyle most frequently in Kununurra.

Although it was not mentioned frequently at other locations, the concern surrounding bush tucker loss was acute in the Ngukurr community, where some community members have a high reliance on traditional foods as part of their diet: for example:

“All we're worried about is those bush tucker, your goanna ... first they eat them [cane toads] and they ... maybe they're dying out” (Ngukurr community member)

This threat was mentioned infrequently at other locations and not at all in Cairns.

Overall, Broome residents expressed the lowest levels of concern around threats and impacts on people.

4.3.2. Positive impacts

Around three per cent of responses related to positive impacts (35 of 1081 responses). They included comments about cane toads eating annoying insects, reductions in numbers of venomous snakes and the benefits of uniting the community around cane toad collection activities: for example:

“Cane toads have done a wonderful thing on binding community together, regardless of what position you come from -if out on a [cane toad] bust, you are all there for same reason.” (Kununurra community member)

The value of cane toads as a catalyst for increasing environmental awareness more generally was also mentioned.

4.4. Management

Summary Box

Findings

- People identified severe limitations to current management around cane toads, including manual collection methods, but still feel it is important to ‘do something positive’.
- There is a high degree of hope that eradication will be made possible through research into a biological control or similar technology.
- There is a high level of interest and participation in individual and community-based cane toad control practices.
- People felt that lethal control methods should be as humane as possible.

Implications

- Given high levels of community awareness regarding the limitations of current cane toad management strategies in achieving population level control, including the inefficacy of manual collection, what policy response is suggested at the community level?
- Given that the community expressed a high level of hope for a biological solution, and an independent review commissioned by DEWHA indicated that there is no clear prospect in the next few years of an agent to stop the spread of toads or to reliably and significantly reduce their numbers where they are established, is there a need for specific communication to the community around this issue?
- Given the high level of community interest in cane toad management and the commitment to shared responsibility of cane toad management, are there opportunities to involve the community in:
 - monitoring activities
 - ecological literacy activities
 - on-ground activities to protect high value assets?
- Given the community concern around inhumane killing of cane toads, what research and communication is necessary around this issue?

Participants in the semi-structured interviews and focus groups were asked a generic question around what could or should be done to manage cane toads. In total there were 1022 responses regarding management. The responses recorded have been broadly grouped under approach, strategies and responsibility for the management of cane toads. Most responses were around approach (396) and potential/current strategies (513), with few responses relating to who should be responsible for managing cane toads (113).

4.4.1. Management approach

Approach relates to what people felt could/should be done about cane toads (396 responses). Figure 8 shows the percentages of responses around what individuals believe is an appropriate approach to cane toad management in Australia.

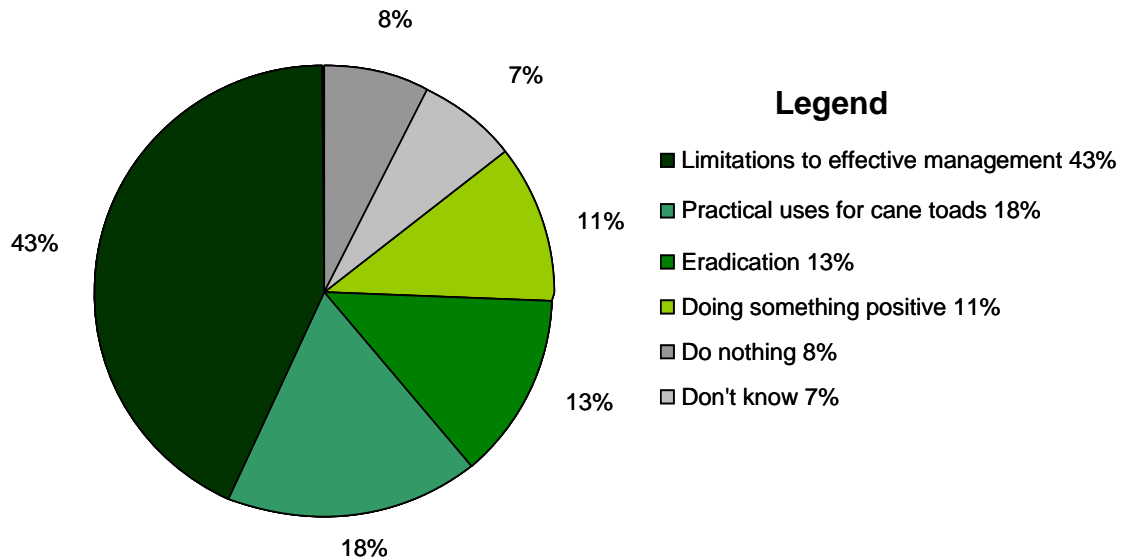


Figure 8 – Approaches for managing cane toads (N=396)

The limitations to effective management of cane toads were mentioned more than any other theme when respondents were asked what could/should be done about managing cane toads. Of these, feelings of hopelessness or impossibility were expressed most frequently: for example:

“We knew they were coming. There was nothing we could do.”
(Ngukurr community member)

Limitations to the effectiveness of manual collection methods were also frequently mentioned. Some community members expressed personal frustration at not having achieved control of cane toads: for example:

“Depressing – we’ve been at it since 2005. I thought it would be 6-12months, I honestly thought scientists would have come up with something. I cry now - they are nearly in headwaters of Lake Argyle.” (Kununurra community member)

Community members not participating in cane toad control activities also felt that manual control methods were having negligible impacts on overall cane toad numbers: for example:

“Do they have any idea of the proportion of the population [of cane toads] they are catching? No one wants to talk about that because there is a perception that they are wasting their time, and there is a perception that they are doing it to whip the government into action.” (Broome community member)

There were also a large proportion of responses about current and future practical or commercial uses for cane toads. The highest proportion of these responses was in Cairns, where there is an existing cane toad products industry: for example:

“People collect them and they send them off overseas. I mean they make great leather. Like there’s other ways of finding a purpose for them, it’s just trying to be creative with it.” (Cairns community member)

References to personal use of collected cane toads for fertiliser also occurred frequently. Some people bury their collected toads in their gardens.

There were also numerous references to the need to eradicate, rather than manage, cane toads: for example:

“Yeah aggressive eradication by whatever means it takes I guess.”
(Kununurra community member)

The need to ‘do something positive’ or ‘make a difference’ was also important to many community members, despite the large number of responses suggesting significant limitations to effective management. It was also felt that ‘doing something’ played a role in educating people about the environment and encouraged a sense of responsibility. Many also felt that, whilst manual collection may not eradicate cane toads, it may slow their progress westwards or help to reduce numbers in specific locations: for example:

“I think it’s good to energise people to... it’s a little bit like, in comparison with Earth Hour or something like that. It’s not the answer, but it’s good to give people a role in the solution, no matter how minor. And I think people feel empowered that they’ve actually done their bit.” (Broome community member).

4.4.2. Management strategies

Strategies for the management of cane toads related to how people felt they could or should be managed, and included current practices as well as aspirations for future management (Figure 9).

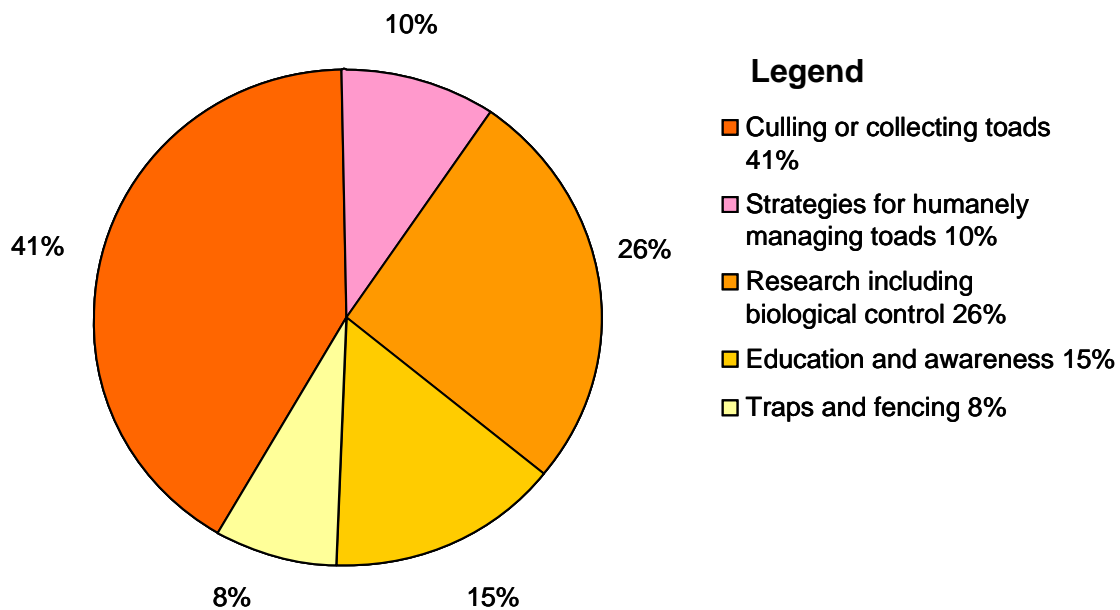


Figure 9. Strategies for managing cane toads (N=513)

The largest number of responses around strategies related to culling or collecting cane toads. This category included comments on personal experiences of cane toad management, such as private or group collection of cane toads, and also individual experiences of cane toad killing, such as hunting cane toads with a golf club or squirting them with antiseptic agents. The greatest number of responses related to manual collection, including independent individual collection and group toad busting or toad mustering activities. Responses around individual and community-based control methods were highest in Cairns. Many of the Cairns responses related to historical individual control methods: for example:

“You know we used to have the old great cane toad hunts and bring out the golf clubs and have a good time.” (Cairns community member)

References to animal welfare were frequently mentioned in relation to individual and community-based control methods: for example:

“Really offends me the way people talk about killing them, beating them to death and running over them. One issue that really concerns me is how to deal with them humanely and how to educate the community when they [cane toads] come.” (Broome community member)

Interest in research, particularly biological control, as a management tool was also a strong theme. The desire for science to come up with a solution was frequently linked to the perceived limitations of other forms of management: for example:

“I think the money should be put into looking for a biological chemical solution rather than paying volunteer groups millions of dollars to collect them by hand...I admire what those people do, but honestly I think it’s a waste of public money.” (Broome community member)

Biological control as a solution was mentioned more frequently in the western case studies than in the eastern case studies.

Community education and awareness were mentioned most frequently in Kununurra and Broome. Respondents in Broome were particularly concerned that people would misidentify and destroy native frogs. Some Broome respondents also expressed concern that the media was creating panic, and that people needed to be educated about the actual impacts of cane toads.

In Kununurra, respondents frequently mentioned the role collection activities play in increasing awareness around the cane toad threat. Increasing education and awareness of cane toads was sometimes mentioned as being a useful catalyst for increasing environmental awareness more generally, and was linked to some of the positive impacts of cane toads: for example:

“Management could be replaced by education – realistic of big picture – raise awareness, so we can manage toads and also fire, cats - the aim is to protect and conserve wildlife, need to address how – toads are a part of that strategy.” (Kununurra community member)

Information sources, such as websites, were also mentioned with respect to education and awareness, particularly in the eastern case studies.

4.4.3. Management responsibility

Only 113 responses around management referred to who was considered responsible for managing cane toads. Responses are divided according to management responsibilities (Figure 10).

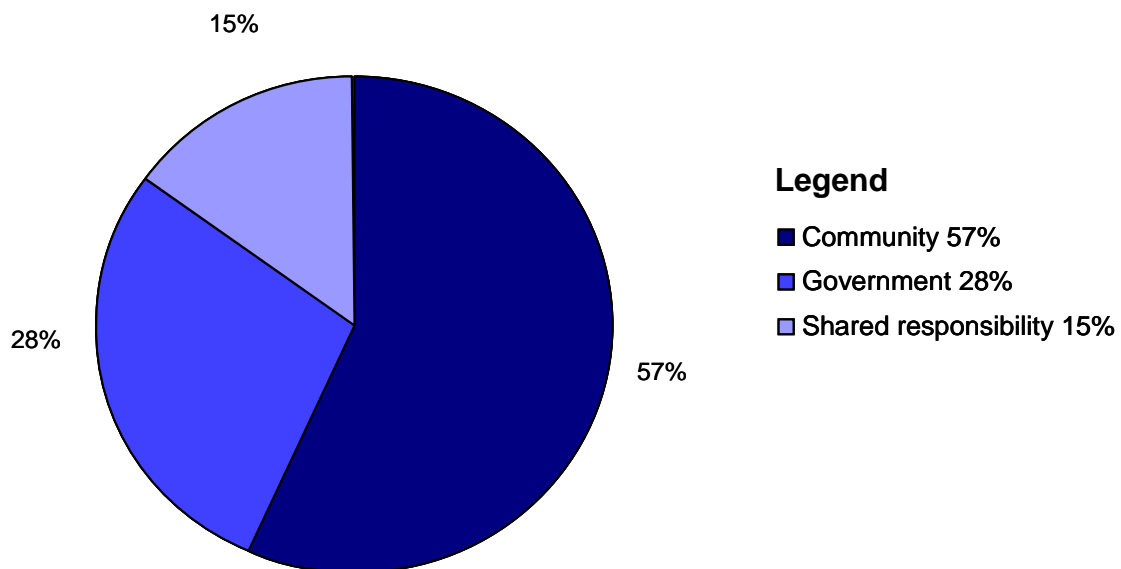


Figure 10. Responsibility for managing cane toads (N=113)

Of all responses, more than half expressed that the community should play a role in management. However, as mentioned earlier in the limitations section, many respondents felt that community management was only part of the solution: for example:

It's not the answer, but it's good to give people a role in the solution, no matter how minor. And I think people feel empowered that they've actually done their bit." (Broome community member)

Around one-third of responses discussing this theme indicated that government had a responsibility to help manage cane toads, and a smaller proportion felt that community and government were jointly responsible for management.

4.5. Other emergent themes

Summary Box

Findings

- There is a perception that the public receives no consistent message about the impacts and management of cane toads in Australia.
- The community is eager for accurate information about cane toads.
- The media plays a key role in shaping the perception of the cane toad threat.

Implications

- Given the range and number of questions the community asked, what kind of consistent messages about the threat that cane toads pose need to be developed and how could they be conveyed?

4.5.1. Questions

During the interviews and focus groups, participants demonstrated a strong desire for more information about cane toads. Questions included, but were not limited to:

- What is known about cane toads?
- What are the actual impacts of cane toads/what studies have been done?
- How effective is current management of cane toads?
- Is there anything on the horizon for eradication?

4.5.2. Media

The other emergent theme was the role of the media in communicating issues and stories about cane toads. In particular, respondents in Broome were concerned about the panic over the cane toad 'invasion' and the potential for an overreaction and hysteria around the arrival of cane toads. Many people also referred to learning more about the science of cane toads through the media, indicating that the media is an important tool for communicating this issue.

"We aren't going to stop them. The reality is that they are going to get here and (we) need to stop the media creating all this panic" (Broome community member).

5. Demographic themes

Summary Box

Findings

- Perception of the threat of cane toads may vary with age, gender and indigenuity.
- Indigenous people and males are generally more accepting of cane toads than non-indigenous people and females.
- Indigenous people displayed more concern around aquatic species, snakes, goannas and bush tucker than non-indigenous people.
- Non-indigenous people displayed more concern for frogs, non-specific environmental impacts, non-specific wildlife impacts, and domestic pets than indigenous people.
- In general, males were more concerned about bush tucker, reptiles and the environment, and females were more concerned about frogs and domestic pets.
- Females were more likely to mention animal welfare issues, and non-violent control methods such as manual collection, while males were more likely to mention methods such as clubbing or hitting and research for cane toad management.
- Non-indigenous people, males and middle-aged people were more likely to mention limitations to management.

Implications

- Given the demographic differences expressed in perception of the threats, impact and management of cane toads, is it appropriate for messages around cane toads to be communicated to different people in different ways?

Responses for the individual semi-structured interviews were also analysed according to demographic data collected. Table 2. provides the demographic data for participants at each location.

Table 2. Demographic data (as assessed by the interviewer) for participants, by location

Site	Total*	Males/Females		Indigenous/Non-indigenous		Young, middle-aged, elderly		
Cairns	37	12	25	10	27	13	15	9
Kowanyama	23	16	7	13	10	6	12	5
Ngukurr	28	13	15	16	12	4	18	6
Darwin	31	10	21	5	26	9	16	6
Kununurra	39	18	21	15	24	11	19	9
Broome	31	22	9	8	23	2	27	2
Total	189	91	98	67	122	45	107	37

*Note: some interviews were conducted with multiple participants at one time.

Demographic themes of interest are discussed in the following sections.

5.1.1. Attitudes towards cane toads

Non indigenous respondents made comparatively more references to a negative attitude against cane toads than indigenous respondents. Responses reflecting an acceptance or indifference towards toads were similar between the two groups.

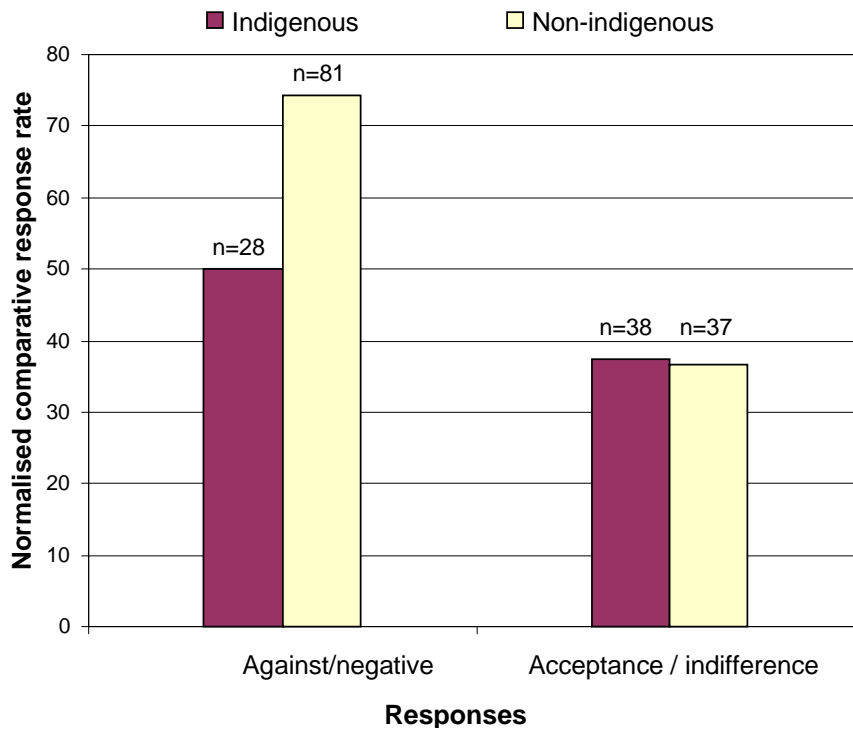


Figure 11. Attitudes to cane toads: responses by indiginity

Differences in reported attitudes towards cane toads between male and female respondents were not marked. However, females did make comparatively more responses reflecting a negative attitude to toads.

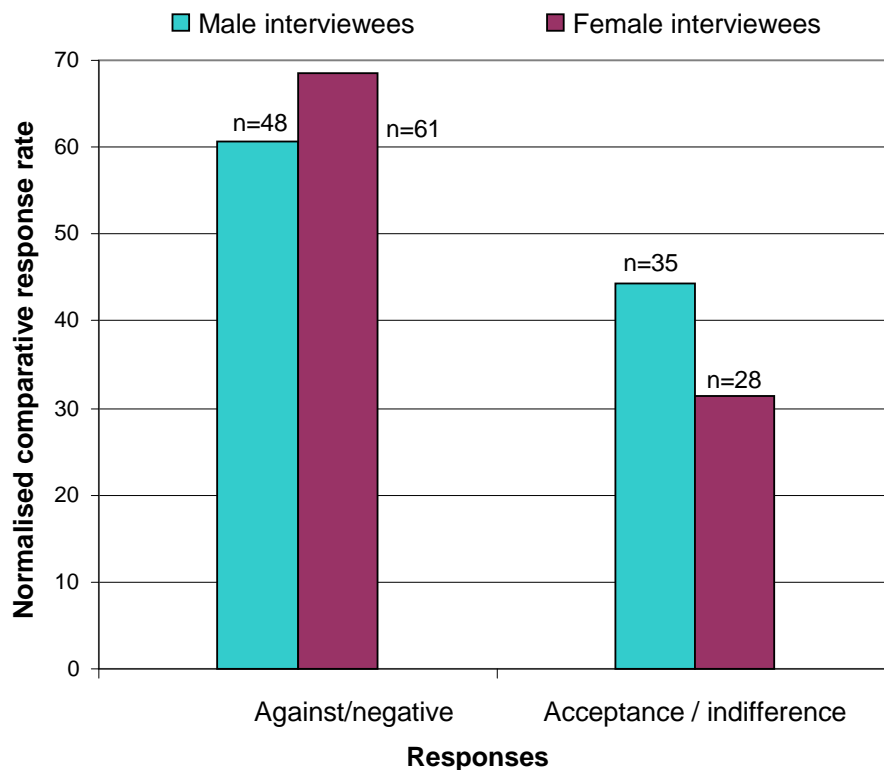


Figure 12. Attitudes to cane toads: responses by gender

5.1.2. Perceived threats and impacts of cane toads

There were demographic differences in responses about the threats and negative impacts of cane toads on native fauna. Overall, more references to threats and impacts on native fauna were mentioned by men and older respondents, with less difference between number of references by indigenous and non-indigenous respondents.

However, there were marked differences in the concern shown by indigenous and non-indigenous participants. Indigenous interviewees made comparatively more responses around the specific threats and negative impacts of cane toads on fish/aquatic species, bush tucker availability, goannas/lizards, snakes and other reptiles. Non-indigenous interviewees reported more concern about frogs and domestic pets, along with general concerns for non-specific wildlife and the environment (Figures 13 and 14).

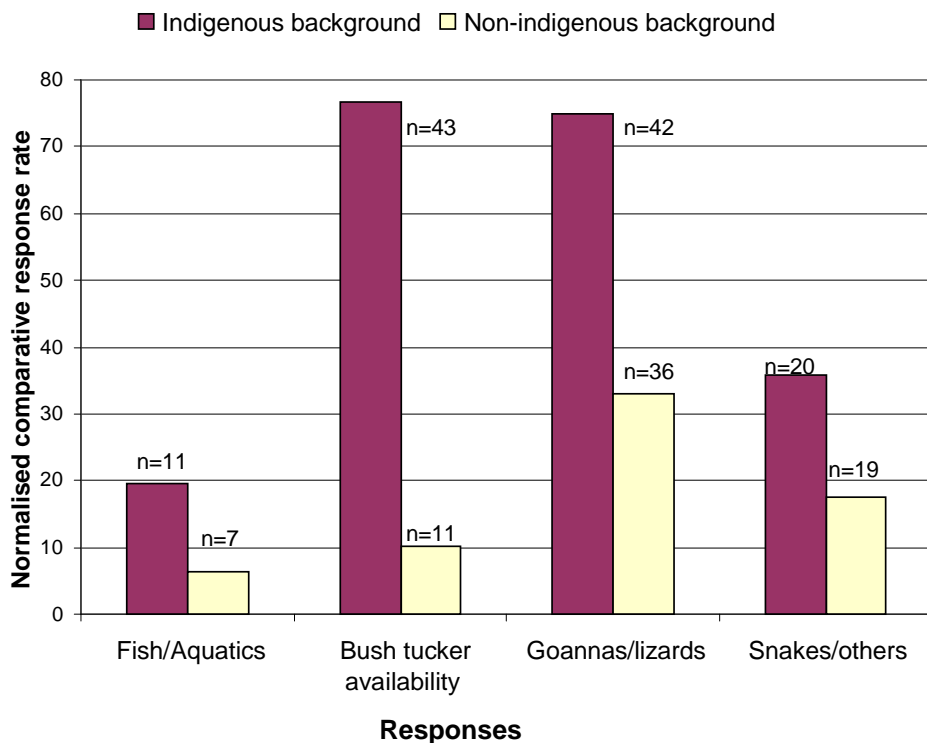


Figure 13. Perceived negative threats and impacts: responses dominated by indigenous people

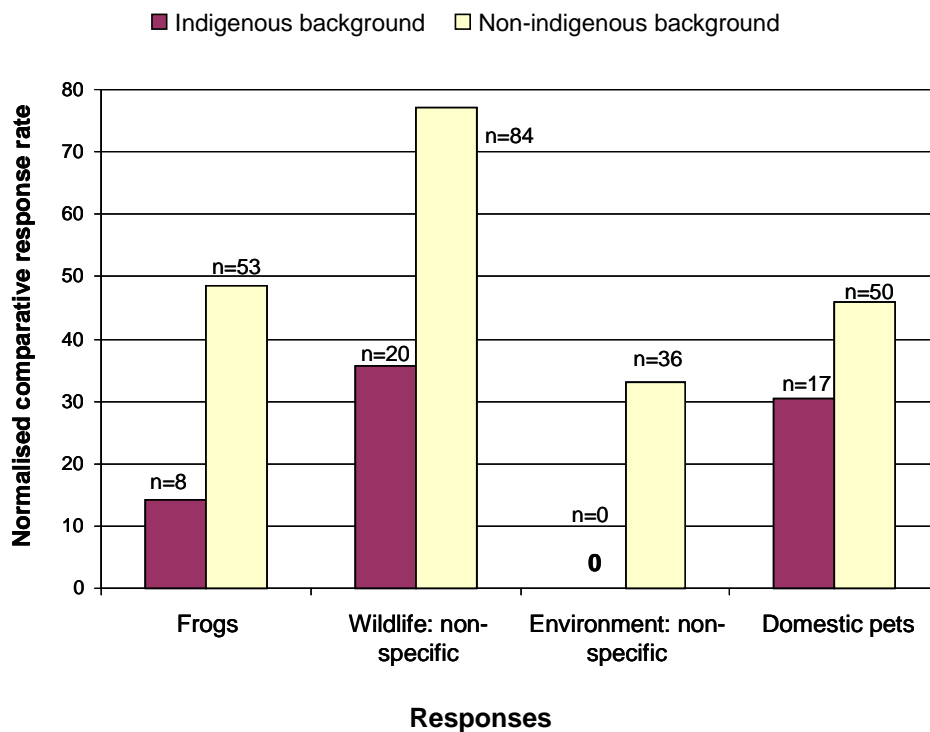


Figure 14. Perceived negative threats and impacts: responses dominated by non-indigenous people

When commenting on threats and negative impacts, response patterns were different between male and female interviewees. Males made comparatively more responses across several threats and impacts themes, including bush tucker availability, general environment and ecology (non-fauna), goannas/lizards, and snakes and other reptiles (Figure 15).

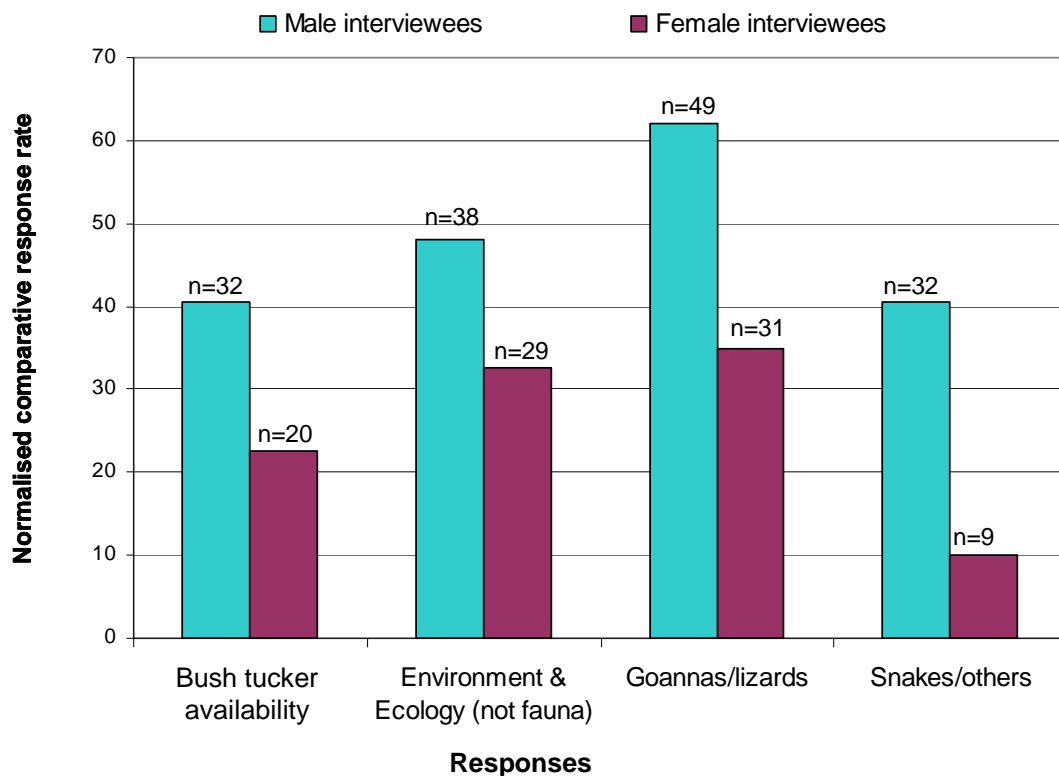


Figure 15. Perceived negative threats and impacts: responses dominated by males

Figure 16 shows there were two key threats and negative impacts themes where females made comparatively more responses than males: frogs and domestic pets.

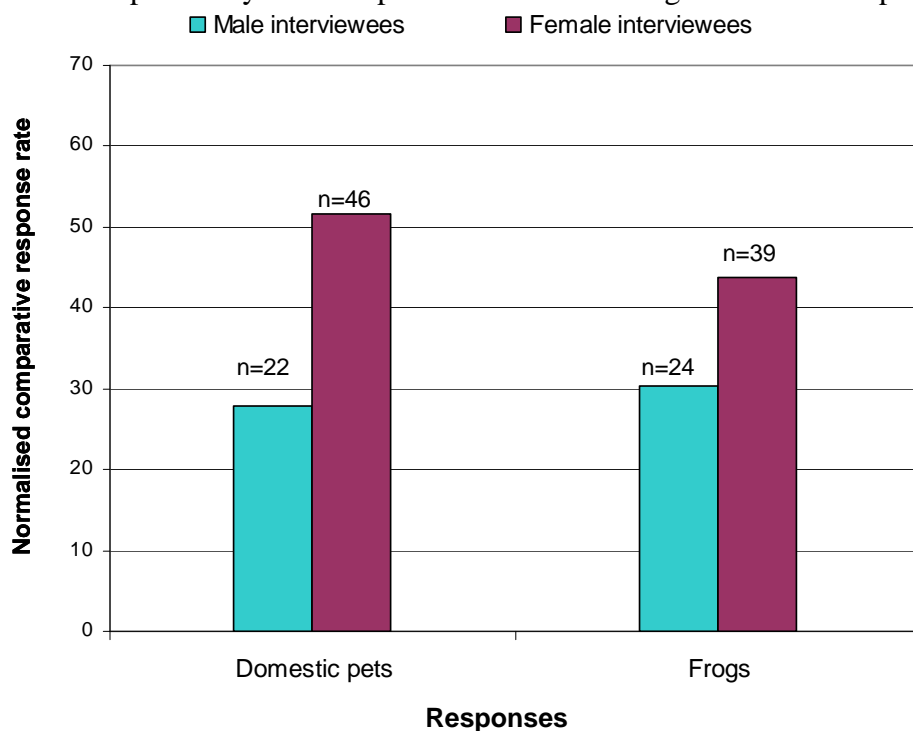


Figure 16. Perceived negative threats and impacts: responses dominated by females

5.1.3. Management of cane toads

Across all management responses indigenous interviewees made comparatively fewer references to management. Differences were also apparent between the age groups, with middle-aged respondents making comparatively more responses across this theme.

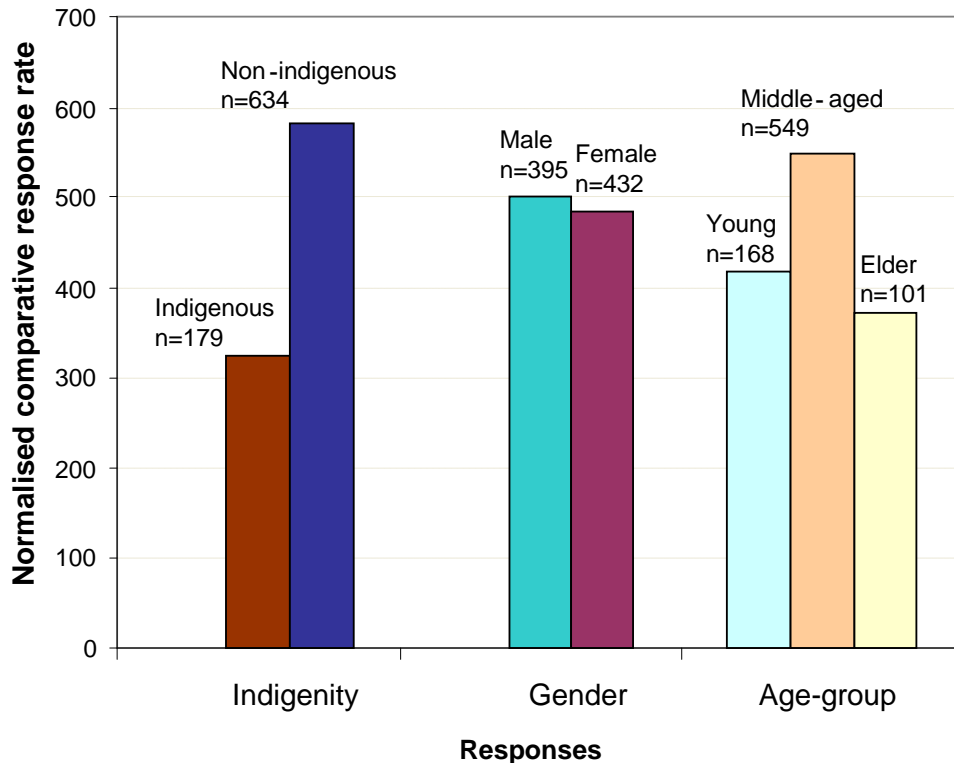


Figure 17. Management of cane toads: responses by attribute

Males and females made similar levels of responses at the broad level of cane toad management. However, their response patterns were different around individual “How to manage cane toads” themes. Females made comparatively more responses relating to the themes of strategies for humanely managing cane toads, non-violent culling methods (methods other than physical hitting or crushing), and toad collection by individuals (Figure 18).

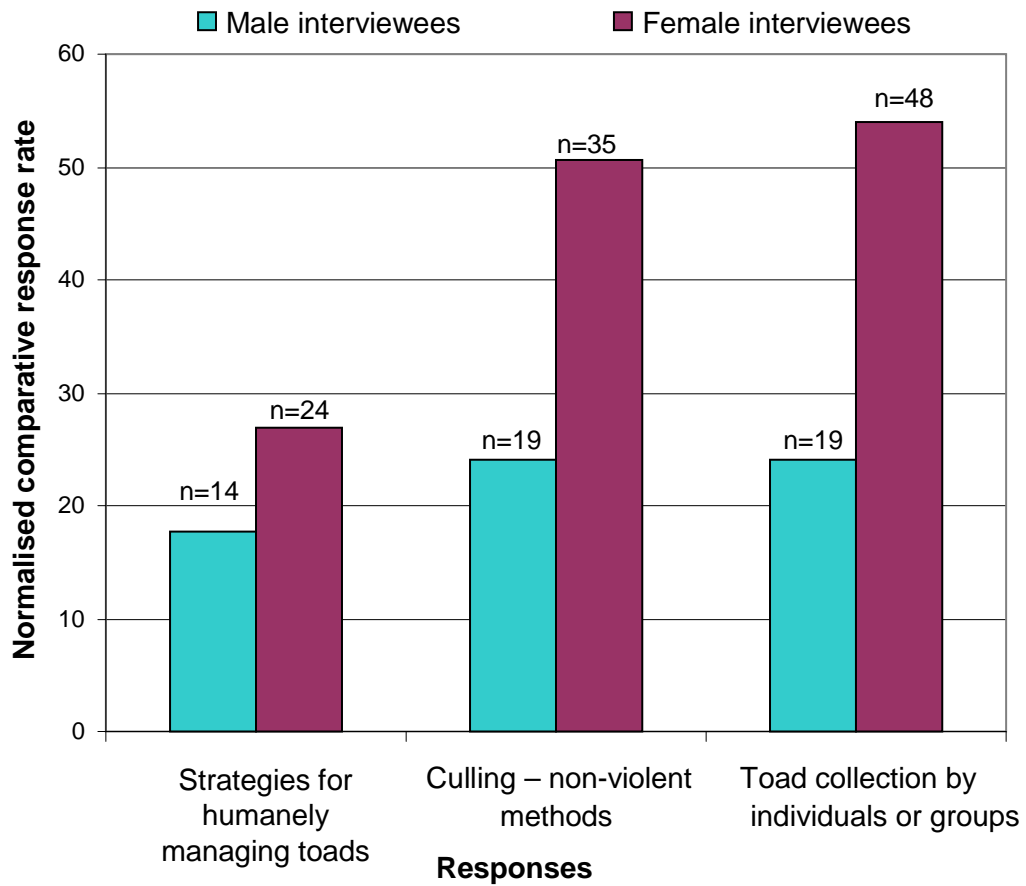


Figure 18. Strategies for managing cane toads: responses dominated by females

Males demonstrated a higher response rate than females around the themes of research into management methods and toad culling by clubbing, whacking or pithing (Figure 19).

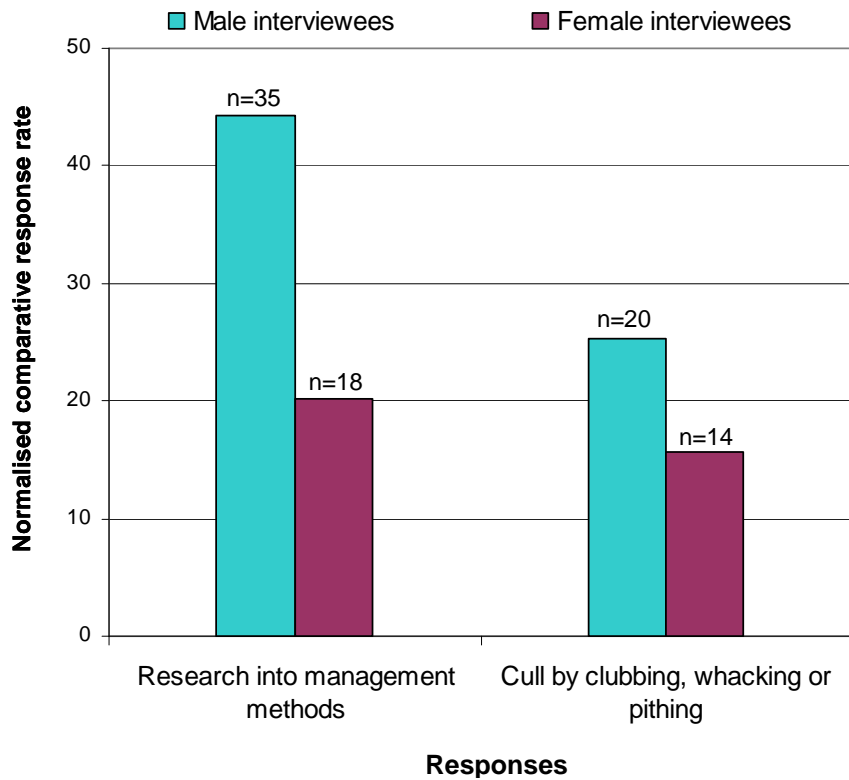


Figure 19. Strategies for managing cane toads: responses dominated by males

Interviewees in the three age-groups had similar response levels across the combined “How to manage cane toads” themes. However, there were differences in some individual how-to-manage themes. Response rates discussing strategies for humanely managing toads and manual collection methods increased across the three age groups. The middle-aged respondents made comparatively more responses about research into cane toad management methods.

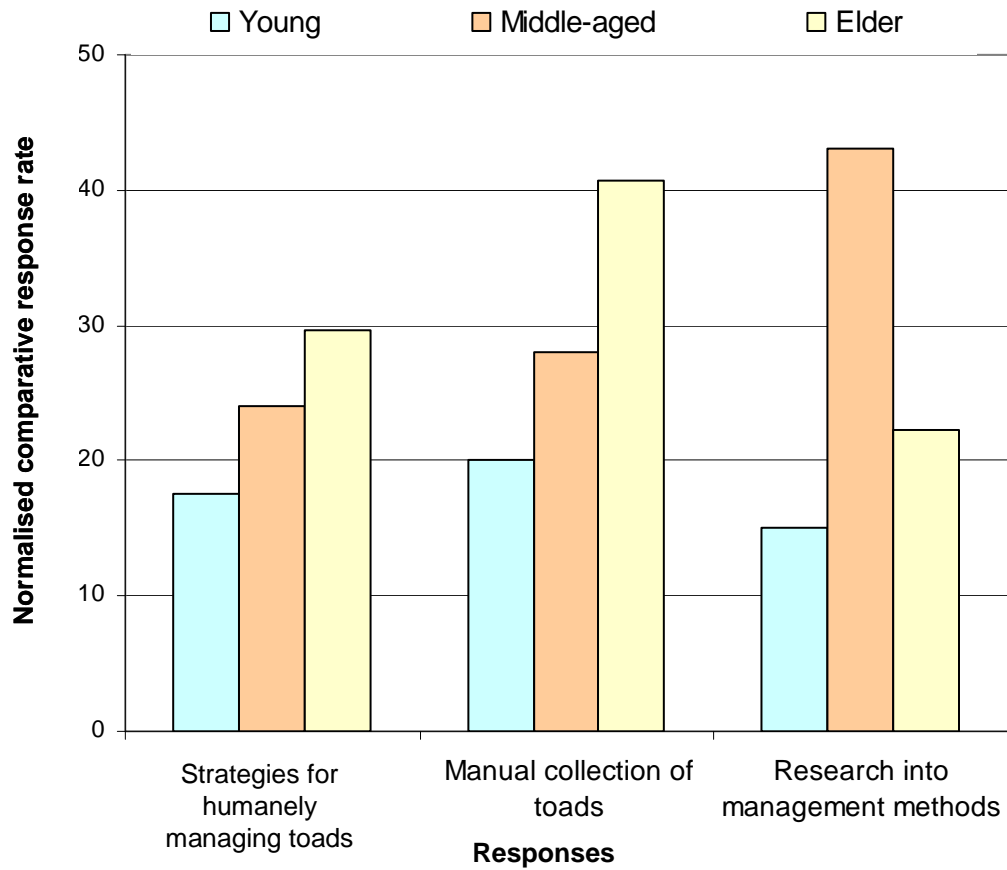


Figure 20. Management of cane toads: responses by age group

Responses regarding the limitations to effective management of cane toads were distributed unevenly according to indiginity, gender and age-group. Non-indigenous respondents made comparatively more responses about management limitations than indigenous respondents, males more than females, and middle-aged more than the young or elder age groups.

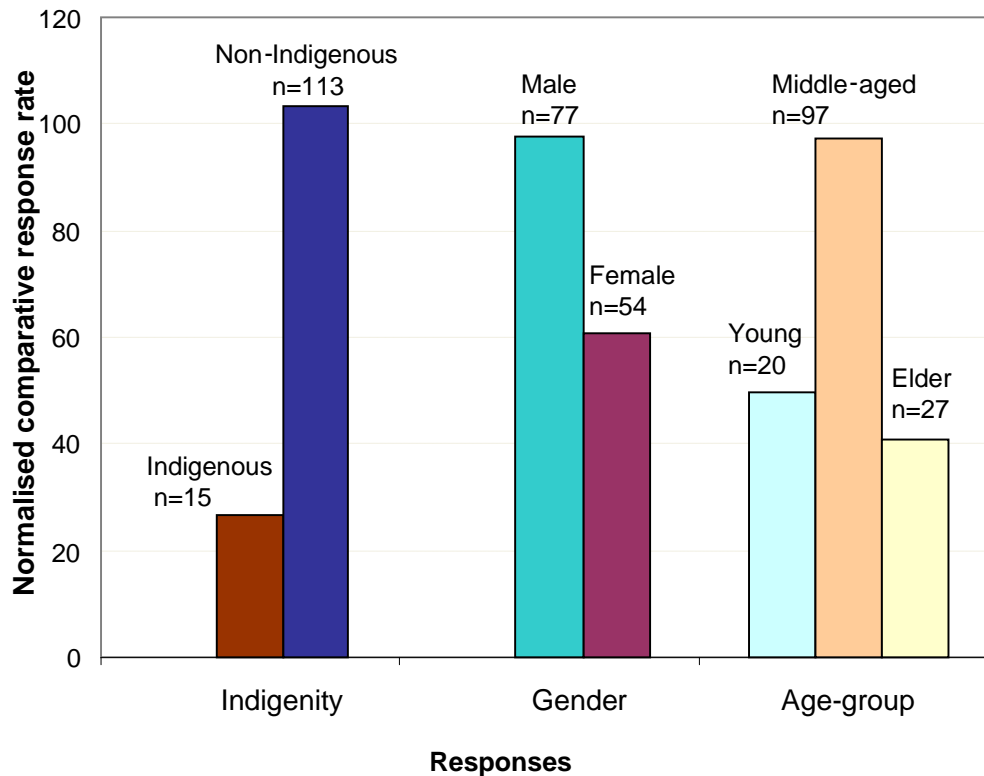


Figure 21. Responses regarding limitations to effective management of cane toads: distribution by attribute

6. Conclusion

The ‘cane toads in communities’ research investigated the way northern communities perceive the threats, impact and management of cane toads over geographic and temporal scales. The research demonstrated that the perception of the cane toad threat changes from east to west, with eastern communities less concerned about the presence of cane toads than communities in the west.

The data were very rich in detail, with a broad range of threats and issues being raised during the research. This suggests that qualitative research is a useful approach for exploring key themes around the spread of cane toads across the Australian landscape.

7. Further questions and research

During the research, many questions were raised. Future research could investigate the following:

- How important is involvement in manual control of pest species in mobilising the community around biosecurity threats? Would the community be equally willing to participate in other activities, such as monitoring pest species and their impacts?
- What benefits might communities have derived from investment in toad busting/mustering activities? Would these benefits make communities more likely to participate in similar conservation activities in the future?

- How does the contextualised perception of a pest species influence the acceptability of lethal control methods?

How does the community perception of the threats, impact and management of other pest species, such as camels, differ from that of cane toads and how does it affect community capacity to respond?

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