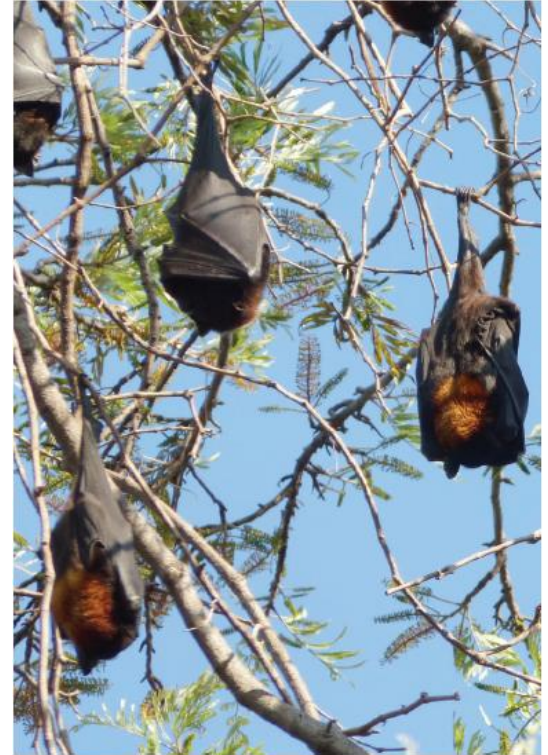


# Gauging attitudes of residents living close to flying-fox camps to inform conflict management



*Black flying-foxes. Photo: Gail Hampshire  
CC BY 2.0 Wikimedia Commons*

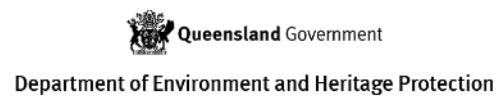
**Dr Pia Lentini**, School of BioSciences, University of Melbourne

And collaborators: Prof Brendan Wintle, Prof Kath Williams, A/Prof Rod van der Ree, Dr Justin Welbergen, Dr David Westcott, Dr Dave Kendal, Dr Kylie Soanes, Ms Kaye Currey

# How should we manage flying-foxes into the future?



**Australian Government**  
**Australian Research Council**




## Kaye's Masters project

- A review of the status quo of management approaches used at FF camps
- Interviewed 15 managers
- Collected 54 responses to a questionnaires, representing 47 camps
- Questions along the lines of what have you done, why did you do it, how much did it cost, how effective did you think it was etc etc.



Article

### Land Manager Perspectives on Conflict Mitigation Strategies for Urban Flying-Fox Camps

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**Abstract:** Over the last 20 years, there has been a notable increase in the presence of flying-foxes (*Pteropodidae*) in urban areas in Australia. Flying-foxes congregate during the day in camps which at times may contain many thousands of individuals. The associated noise, smell, mess and concerns about disease transmission can result in significant conflict with local communities. Managers of flying-fox camps use a range of management approaches to mitigate tensions, but the success or otherwise of these has been largely undocumented. Land managers were surveyed to determine the relative cost and perceived effectiveness of mitigation strategies using semi-structured interviews and an online questionnaire. We found that five actions were commonly used to manage flying-foxes: (1) stakeholder education, (2) the creation of buffers between camps and adjacent residents via vegetation removal or (3) the creation of buffers via deterrents, (4) dispersal of flying-foxes via disturbance, and (5) dispersal of flying-foxes via vegetation removal. Perceptions of effectiveness varied considerably among managers. Overall, the creation of buffers via vegetation removal was considered the most effective action, and stakeholder education was perceived to be the least effective. Dispersal via disturbance was also considered effective at reducing complaints and improving amenity, but not particularly effective overall likely due to the often short-term relief provided to residents before camps were recolonised. It was evident that the actions taken by managers and their perceived effectiveness were influenced by the attitudes of the community. This highlights the importance of considering the human dimensions of human-wildlife conflict in mitigation strategies.

**Keywords:** wildlife management; human-wildlife conflict; *Pteropus*; human dimensions; dispersal; buffers; Chiroptera; urban ecology

#### 1. Introduction

Human-wildlife conflict is a significant issue in many parts of the world [1]. Major drivers of conflict are the encroachment of expanding human populations into wildlife habitat, or wildlife colonising or utilising human-dominated areas [2]. Although direct damage caused by wildlife is often implicated as the main cause of conflict, in reality, conflict can arise whenever the presence of wildlife threatens, or is perceived to threaten human interests, be they aesthetic, social or economic [3,4].

While much of the human-wildlife conflict literature focuses on large vertebrates [2], other species such as bats can cause conflict. The Pteropodidae family comprises over 170 species of flying-foxes and is distributed widely in tropical and subtropical countries [5]. Flying-foxes feed primarily on flowers and fruit, and are vital pollinators and seed dispersers for a large range of food, timber and forest

## The impacts of flying-foxes on local communities

The main impacts of flying-fox camps were perceived by camp managers to be noise, smell, concerns about the transmission of serious diseases, and loss of amenity (Fig. 3). Beliefs that the community was concerned about negative impacts on property values and business profits also ranked highly. Impacts on the local environment were not considered to be as important. 'Other' factors included mess from faeces, concerns the camp would continue to grow, and impacts on tourism and community gatherings.

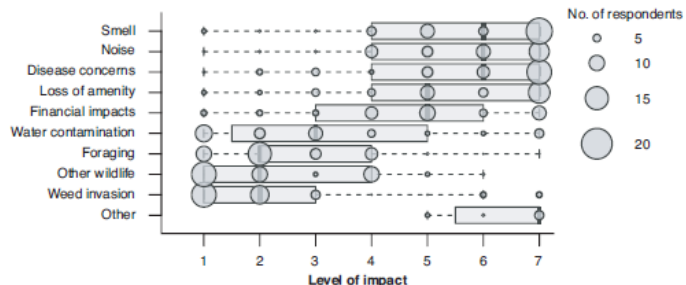


Figure 3 – Perceived level of impacts of flying-fox camps on local communities and the environment

Respondents could rate impacts from 1 (no impact) to 7 (serious impact). For each impact category the spread of data are shown as box plots (with the median and quartiles). The circles indicate how many respondents gave a particular score for a particular category; for example few (3) respondents indicated that smell was only having an impact of 1, while 17 respondents indicated it was having a serious impact of 7.

## What triggers managers to take action

Residents were identified as the most important trigger for making the decision to actively manage a camp, followed by vocal stakeholders, the media and elected representatives (Fig. 4). 'Other' factors considered important by camp managers were the camp expanding onto Council land, the public risk from tree damage, and the costs versus potential benefits of actions.

Some responses which exemplify this were:

*"There was a very small minority of very, very, vocal against the bats, a very small minority are really positive about bats, and everyone else is somewhere in the middle..."*

*"This community was a really difficult one because we had a very vocal councillor who was feeding quite a lot of misinformation into the local area"*

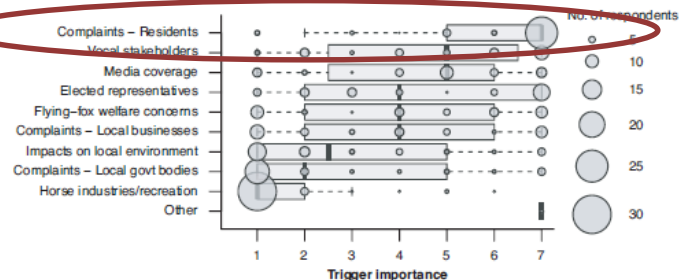


Figure 4 – Perceived importance of different triggers in the decision to manage a camp (beyond status quo maintenance)

Respondents could rate the importance of a trigger from 1 (not important) to 7 (very important). For each trigger category the spread of data are shown as box plots (with the median and quartiles). As with Figure 3, circles indicate the number of respondents to give each score.

## Effectiveness of management actions

Participants in the surveys were asked to rate the perceived effectiveness of the five most commonly used approaches from 1 (not effective) to 7 (very effective) against a range of objectives. A common theme in our interviews and surveys was the positive response of residents to many of the actions simply as a result of them feeling that their concerns had been heard:

*"We identified that there was an opportunity there to do some vegetation management to just increase buffers. And so the fact that we identified those options and you know, facilitated the process ... the community could see some action and some understanding and some sort of ownership of the issue from council ..."*

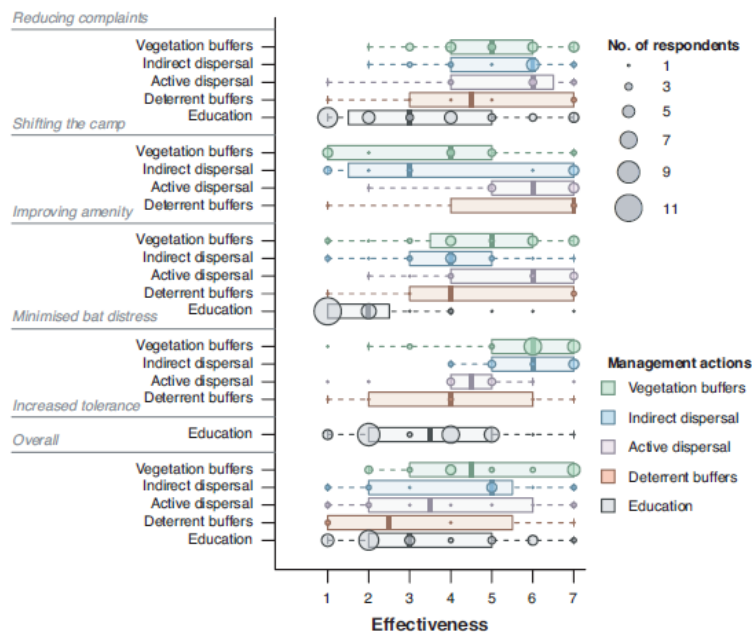


Figure 6 – Perceived effectiveness of management approaches, scored against a range of objectives.

For each management objective (reduce complaints, shift the camp etc) the spread of data are shown as box plots (with the median and quartiles), and each management approach is shown in a different colour. The circles indicate how many respondents gave a particular score for a particular objective/approach.







## Phase 1: Community interviews

Targeted residents living close to (<250m) camps along the east coast

Tried to visit both contentious and non-contentious camps

Talked to people with a range of views

Tried to cover a diversity of camp and management histories

Aim was to understand the language people use, and what they perceive to be the key issues and benefits

## General perspectives on flying-foxes

- Have there always been flying-foxes in this area? When did you first notice them?
- When you think about flying-foxes or bats, what are first words that come to mind?

## Perceptions of the specific camp and its impacts

- Do you know how long it's been there? Are the flying-foxes here all year round, and do the numbers change a lot month-to-month or year-to-year? Do you know what species they are?
- Has the camp had any direct impact - positive or negative - on you or your family/household?



## Perceptions of the managers

- What have you noticed them doing on the site? Any noticeable management activities or events?
- Are you satisfied with management of the camp? Do you think the managers are doing a good job?

## Perceptions of management actions

**EDUCATION AND ENGAGEMENT**

Education and engagement can take many different forms from interpretive signage to involvement in activities such as bat rights, citizen science, community surveys and information evenings.

The aim of these is to inform the public about flying-fox ecology, behaviours, and management. They are also a means to hear community perspectives and collect feedback.



**Collaboration for Night**  
The University of Melbourne

**Night event**  
Image: Samantha Gould Council


**Interpretive signage**  
Image: Samantha Gould Council

**Information sheets**  
Image: Samantha Gould Council

**DISPERSAL VIA VEGETATION REMOVAL**

This approach involves the removal of most of the vegetation in the camp when the bats are not present (out feeding at night or roosting elsewhere).

The aim of this type of dispersal is to stop the camp from re-establishing, either because the bats have nowhere to land or because the conditions in the camp are no longer suitable.



**Image: Jason Dym**

**Image: Peter Hayden**

**Image: Steve Palmer**

**Image: Mark Dickinson**

**BUFFERS**

This approach involves the removal of a "buffer" of vegetation between the land bordering on the camp and the camp itself.

The aim of this is to create some distance between residents and flying-foxes.



**Image: Jason Dym**

**Image: Leon Anne Stragler**

**Image: Katherine Day Foot**

**Image: Samantha Gould Council**

**ACTIVE DISPERSAL**

This approach involves the creation of disturbances such as noise, smoke, water and light at dawn when the bats are coming back from feeding, to discourage them from landing.

The aim of active dispersal is to discourage the flying-foxes roosting in the immediate area at all.



**Image: Samantha Gould Council**

**Image: Samantha Gould Council**

**Image: Samantha Gould Council**

**Image: Samantha Gould Council**

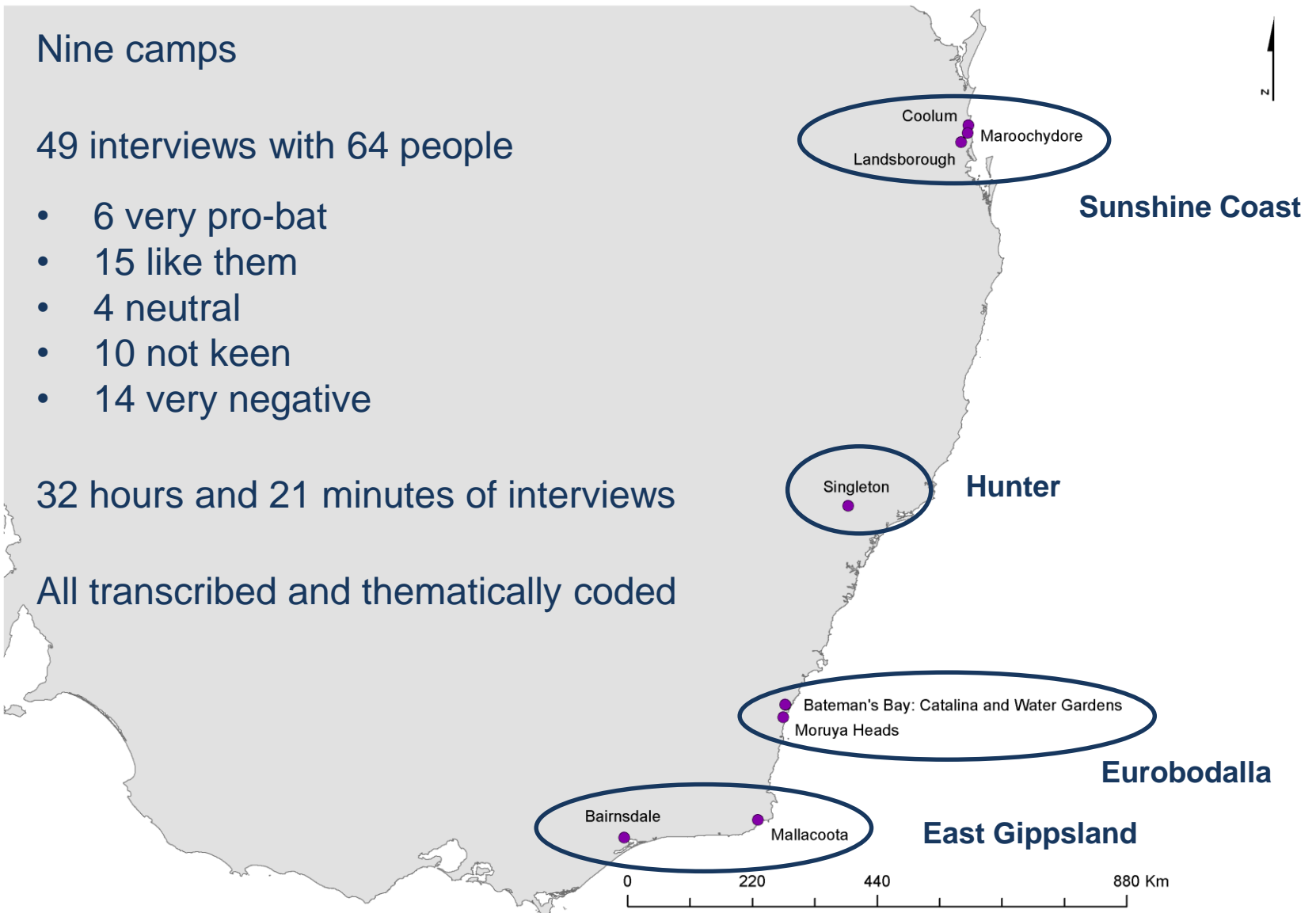
Nine camps

49 interviews with 64 people

- 6 very pro-bat
- 15 like them
- 4 neutral
- 10 not keen
- 14 very negative

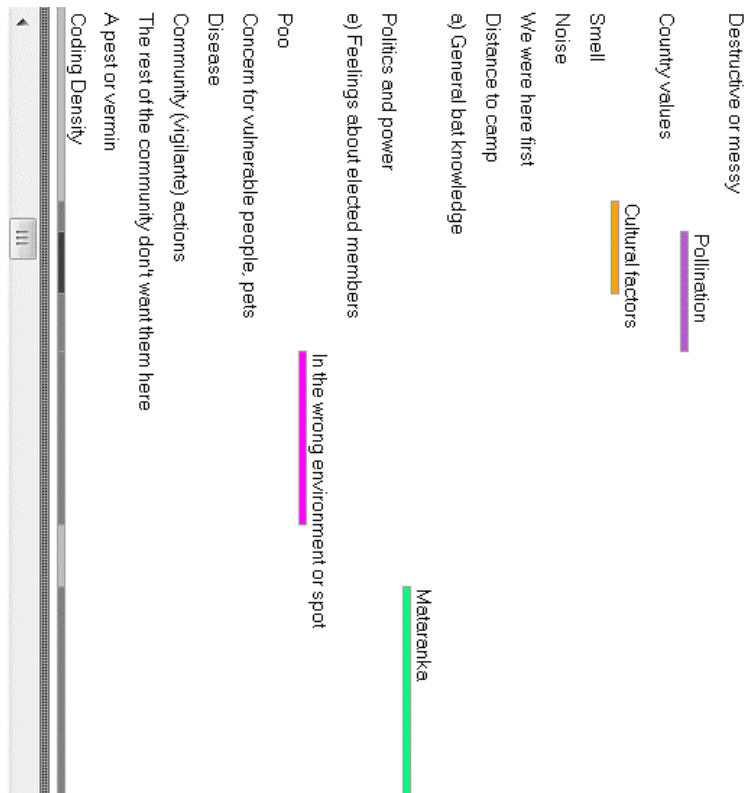
32 hours and 21 minutes of interviews

All transcribed and thematically coded



# Thematic coding

<b>Resp:</b>	The dogs you can, you can get baits, 10-80 baits you can put out for the dogs. I put out 72 baits one year and I only recovered 12, so that means 60 of them were taken, but I only found one dead dog. So, how effective it is, I don't know.
<b>INT:</b>	Alright, we'll get back to the bats because I know you have to go. So, if you were thinking about bats, what words spring to mind?
<b>Resp:</b>	I suppose traditionally to a lot of people they've got a bad reputation, a scary reputation. They're always in horror films and all that sort of stuff, but we understand that they have a purpose in the ecology. Very important as far as regenerating some of the gum vegetation in the ecology.
<b>INT:</b>	So, you can sort of see some benefits to the species?
<b>Resp:</b>	Oh yeah.
<b>F:</b>	Just not in suburbia.
<b>Resp:</b>	All the experts tell you that it'd be detrimental to the ecology if they weren't here, if we simply just shot them all, so we believe those experts, but equally, there's got to be a way around keeping them out of our living space, if you like. I also saw what they did do to Mataranka in the Northern Territory. We've travelled through there many times and that's in the high trees again. Security of height and they just decimated the whole place. They eventually went. They put sprays. They put water up the trees and I think they hit them with water during the day, so they couldn't roost, and they eventually moved on, but I think by then they'd destroyed the habitat anyway.



Destructive or messy  
 Country values  
 Cultural factors  
 Smell  
 Noise  
 We were here first  
 Distance to camp  
 e) General bat knowledge  
 Politics and power  
 e) Feelings about elected members  
 Poo  
 Concern for vulnerable people, pets  
 Disease  
 Community (vigilante) actions  
 The rest of the community don't want them here  
 A pest or vermin  
 Coding Density  
 Pollination  
 In the wrong environment or spot  
 Mataranka

## Bairnsdale (10)



Impacts on path where they walk  
EPBC approval process  
Veg removal in phases  
No much communication from council, forum with David Westcott

## Mallacoota (9)



Seasonal camp  
“Tree changers” and gentrification  
Water tanks  
Massive influx of GHFF, 1/3 pop  
Dislike of council: far away, don’t care



## Maroochydore (3)



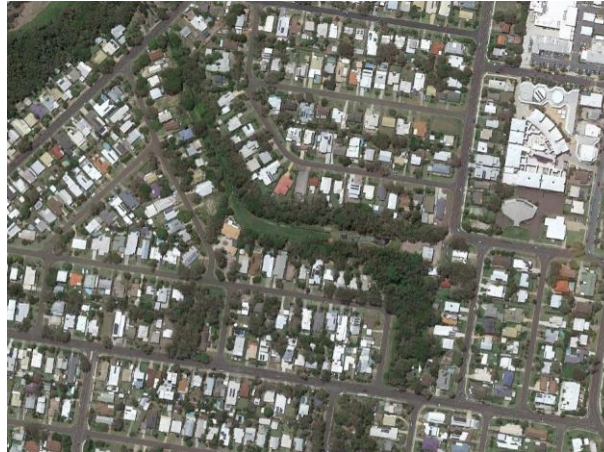
Camp not on council land  
– school

Expensive failed  
dispersal + buffer (\$111K)

Disp now off the table

Proactive local group,  
community meetings

## Coolum (6)



Camp seems to have est  
after another dispersal

A couple of failed  
dispersals (\$150K)

Council installed sprinklers

Vigilante actions – tree  
deaths, shooting

## Landsborough (3)



Has been there for a  
while, seasonal?

Community tensions,  
petitions and disturbances

Gentrification

Moderate buffers and  
signage (\$11K)



## Smell

*“Thick. Very thick. You could almost taste it”  
(BB WG)*



## Property values

*“He gets feedback from the agents all the time.  
People come in, they see the bats camped at the  
back, and that’s it.” (CO)*



## Quality of life

*“...the people had no life there. They couldn't sit out in their back terraces... they've got to **lock themselves inside their home and have their air-conditioning on.**” (MD)*



## Attitudes about people

*“There's a certain **redneck element in town, some people just don't like nature, particularly if there's a lot...**” (MA)*



*“There's a whole lot of people - **people who don't live here... come and tell us we've got to keep the bats here**” (SI)*



## Interesting, cute, nice to watch, pollinators

*“I think they’re fascinating actually, yeah, absolutely fascinating. One of nature’s real wonders” (MH)*



## Part of nature??

*“I’m not against nature, I love birds and things and they don’t do any damage, but these things just do damage wherever they go.” (SI)*



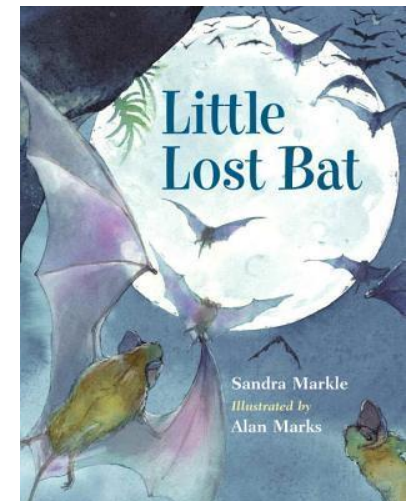
## Diseases

*“I know they’re – we mustn’t touch them because some of them can be very deadly and have diseases, so we don’t touch them... **I know if dogs eat them they – dogs can get really sick and die, and people can get very sick too**”. (BB CA)*



## They are just in the wrong place

*“Oh, I think as far as flying foxes as a species goes I’m positive, I like them... So, yeah, I’ve got no problem with them in their natural habitat. **When they’re in an unnatural one right in the middle of our town, it’s not so good.**” (BB WG)*



## Education

*“...tolerance and living next-door to them are just two different issues. I’m fascinated with flying fox behaviour and what they do, but living next-door to them is just horrendous and no amount of education is going to change that.” (CO)*



## Threat status

*“If they’re an endangered species, there’s a hell of a lot of them.” (SI)*





## Values and attitudes

People should take precedence, we were here first

*“I've lived here all my life.... I don't really believe that human beings should be given the minority opinion” (SI)*

People should live in harmony with nature, the bats were here first

*“...they're a native species... we have to live with them, not fight against them. I can't imagine not to have the bats here, or what it could do. (CO)*

## Managers and politics

*“As I said, they are hamstrung... But they could've acted a little quicker... I think it's sitting in the too hard basket for them, and I can understand why” (BD)*

*“Why would people develop in an area that was known to have a bat roost, so I'm not sure if the buyers got those reports going with, but certainly no-one was aware.” (MD)*



## Our working theory...

**Distance** moderates sensory impacts (smell)

×

**Baseline expectations** (camp size, influxes, permanence)

×

**Dominionistic values** (whose rights take precedence)

## Phase 2: Quantitative surveys

Large-scale, quantitative survey that will allow us to build robust statistical models.

Address two key questions:

- What shapes resident's attitudes towards flying-fox camps and their management?; and
- What factors influence whether a flying-fox camp is or isn't 'controversial'?

We are aiming to target 30 camps and send surveys to about 8,000 residents (to get 1,000 responses)

...but we need your help! **Nominate a camp.**

## Manager's survey

Have kept this as brief as possible, it should take about 5 minutes per camp

- Your name and agency, whether there is a FF management strategy
- The name of the camp, the location, whether it's controversial
- How many bats use the camp
- How many pieces of correspondence your receive about it
- Rate from 1-7 the impacts on residents, the community tension, and the level of resentment directed at you
- Tick-a-box to indicate what management actions have been used

THEN I'll send you a map and ask you to trace the outline of the camp





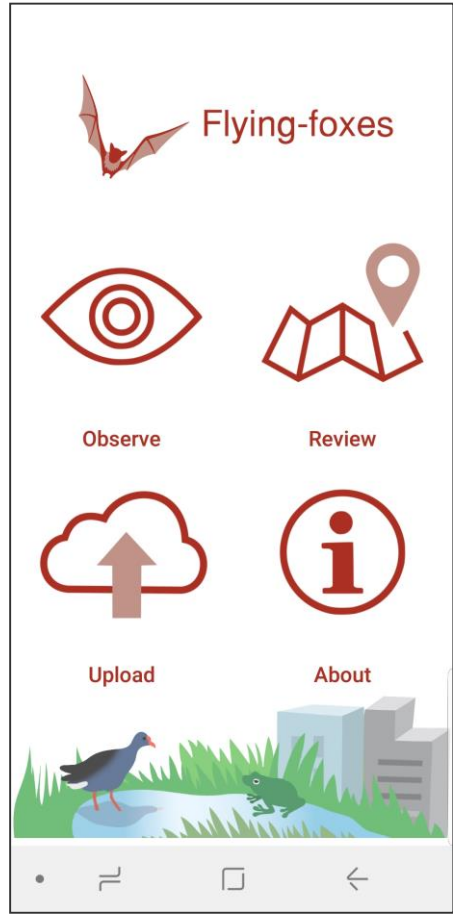
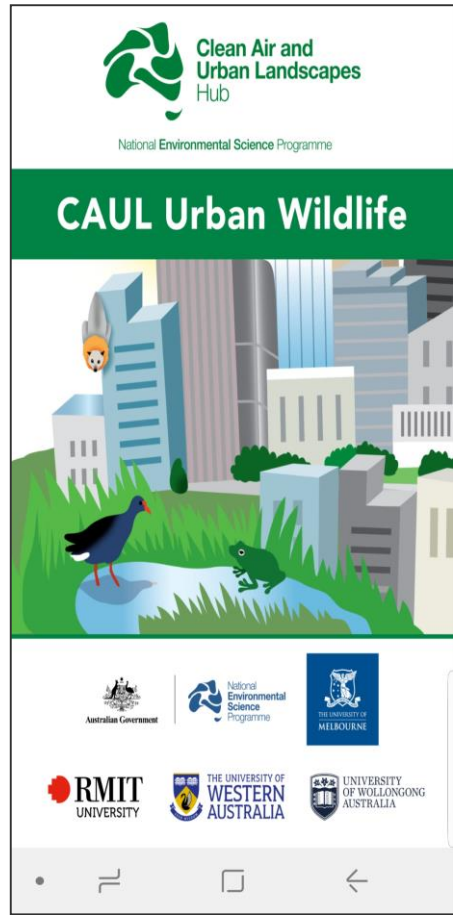
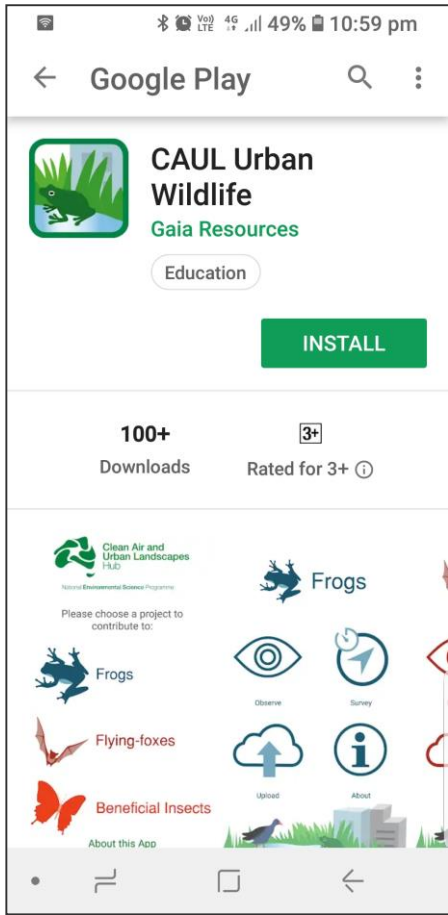
As with the previous work, the findings will be published as an academic paper but also a more accessible report.

The results can also be linked to ecological data relating to camp counts, movements etc.

There are limits to what data we can share, but we do want to help you better understand to situation around your camps.

**And now for a final couple of plugs...**

# Flying-fox app



Cultivated fruits	Other fruiting species	Lilly pilly and native cherry ( <i>Syzigium</i> )	Eucalypts cont'd	Paperbark ( <i>Melaleuca</i> )
Cashew	Lemon aspen	Brush cherry	New England Blackbutt	Cajuput
Sour-sop	Red ash	Sour cherry	Orange gum	Karnbor
Custard apple	<i>Barringtonia</i> sp.	Purple cherry	Southern blue gum	Broad-leaved paperbark
Pawpaw	Scrub turpentine	Weeping lilly pilly	Blakely's red gum	Prickly-leaved paperbark
Mandarin	Chinese elm trees (introduced)	White apple	Bangalay	Broad-leaved paperbark
Orange	Five-leaf water vine	Broad-leaved lilly pilly	River red gum	
Persimmon	Cotoneaster	Red apple	New England blackbutt	<b>Silky oak (<i>Grevillea</i>)</b>
Loquat	Tuckeroo	Kuranda satinash	Sugar gum	Silky grevillea
Lychee	Davidson's plum	Riberry	Gympie messmate	Southern silky oak
Apple	Silky myrtle	Blue lilly pilly	Yate	
Mango	Giant stinging tree	Magenta cherry	Mountain blue gum	<b>Banksia (<i>Banksia</i>)</b>
Mulberry	Shining-leaved stinging tree	Watergum	Broad-leaved ironbark	Tropical banksia
Banana	Myrtle ebony	Lilly pilly	Flooded gum	Coastal Banksia
Olive	Native tamarind	White Eungella gum	Pink bloodwood	Old Man Banksia
Avocado	Koda		Bushy yate	
Apricot	Broad leaved ballart	<b>Palm trees</b>	Yellow gum	<b>Bottle-brush (<i>Callistemon</i>)</b>
Cherry plum	Glory vine	Alexander palm	Grey gum	Common red bottlebrush
Peach	Silky myrtle	Bangalow palm	Red stringybark	Narrow-leaved bottlebrush
Plum	Broad-leaf privet (introduced)	Rattan palm	Maiden's gum	White bottlebrush
Stone Fruit	Cockspur thorn	Carpentaria palm	Grey gum	
Nectarine	White kamala	Cabbage palm	Silver-leaved ironbark	<b>Other species</b>
Cherry	Wongi	Sand palm	Yellow box	Queen wattle
Guava	White cedar	Mataranka palm	Darwin woollybutt	Swan river peppermint
Pomegranate	Southern Melodinus	Royal palm	Grey box	White siris
Rollinia	Sweet Morinda	Canary Island date palm	Yellow stringybark	Grey mangrove
Choko	Bur tree	Date palm	Narrow-leaved black peppermint	Illawarra flame tree
Tamarid	Kurrajong mistletoe	Cocos palm	Grey Ironbark	Moreton Bay chestnut
Grape	Nonda plum		Parramatta red gum	Camphor laurel (introduced)
	Native passionfruit	<b>Eucalypts</b>	Blackbutt	Gynea lily
<b>Fig (<i>Ficus</i>)</b>	Brown beech	Sydney red gum	Sydney peppermint	Coral tree
Weeping fig	Sweet pittosporum	Rough-barked apple	Needlebark	Hibiscus
Plentiful fig	Black apple	Smooth barked apple	Small-fruited grey gum	Japanese raisin (introduced)
Creek Sandpaper fig	Yellow boxwood	Lemon-scented gum	Large-fruited grey gum	Sweetgum (introduced)
Round-leaved Banana fig	Plum pine	<i>Corymbia clavigera</i>	Large-fruited blackbutt	Tulip tree (introduced)
Rubber plant	Canary beech	Yellow bloodwood	Narrow-leaved peppermint	Brush box
Sandpaper fig	Leatherwood	Red flowering gum	Red mahogany	Hairy-leaved bolly gum
Moreton Bay fig	Zig zag vine	Red bloodwood	Swamp messmate	Poplar (introduced)
Small-leaved fig	Seaberry saltbush	Large-leaved spotted gum	Steel box	Mangrove
Sweet sandpaper fig	Malletwood	Pink bloodwood	Sydney blue gum	Willow (introduced)
	Native raspberry	Spotted gum	Narrow-leaved red gum	Umbrella tree
	Yellow elderberry	Ghost gum	Grey ironbark	Devil's fig (introduced)
	Peppercorn (introduced)	Long-fruited bloodwood	Mugga ironbark	Firewheel Tree
<b>Quandongs (<i>Elaeocarpus</i>)</b>	Crabapple	Carbeen	Eucalypt	Turpentine
Blue marble tree	Kangaroo apple	Cadaga	Forest red gum	Athel pine (introduced)
Kuranda quandong	Wild tobacco (introduced)	Brown bloodwood	Darwin Stringybark	Rosewood (introduced)
Blue quandong	Brown damson	Northern spotted gum	Red ironbark	Kanooka
Hard quandong	Country-almond	White mahogany	Manna gum	
Blueberry Ash	Damson plum	White box		
	Berombong	Cabbage gum		

## Kaye's PhD project...

*Decision-making in complex  
human-wildlife conflict  
situations*



**How? Who? Stakeholders? Useful? Constraints?**