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Manager perspectives on strategies used at flying-fox camps

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Manager perspectives on strategies used at flying-fox camps

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Front cover: Black flying-fox. Photo: James Niland CC BY 2.0 Wikimedia Commons

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Flying-fox management in Australia

Mainland Australia is home to four species of flying-foxes or 'fruit bats' (Figure 1). Flying-foxes are increasingly found in urban areas, most likely because of ongoing habitat loss and an increase in the diversity and reliability of foraging resources in many cities and towns. Roosts (or 'camps') of flying-foxes can vary in size, ranging from hundreds to many thousands of bats. The associated noise, smell, mess, loss of amenity and perceived disease risk of these can result in conflict with local communities.

Land managers use a range of approaches to address community concerns about the impacts of flying-fox camps. However, they are often operating with limited resources, time, and few opportunities to interact with- and learn from- others in the same situation. Collating and sharing their experiences and knowledge will highlight key factors and risks to consider, and hopefully provide a more realistic picture of costs that can then be incorporated into planning.

In 2017 we conducted interviews with- and distributed an open invitation to managers to complete an online questionnaire (consisting of 35 questions) to understand why they chose to actively manage camps, what they had tried, how effective they perceived it to be and what it cost. Our findings provide a general picture of what many managers of flying-fox camps are doing.

A full open-access version of this study has been published here:

Currey, KC, Kendal, D, van der Ree, R, and Lentini, PE (2018) Land manager perspectives on conflict mitigation strategies for urban flying-fox camps. *Diversity* 10(2), 39. DOI: <https://doi.org/10.3390/d10020039>

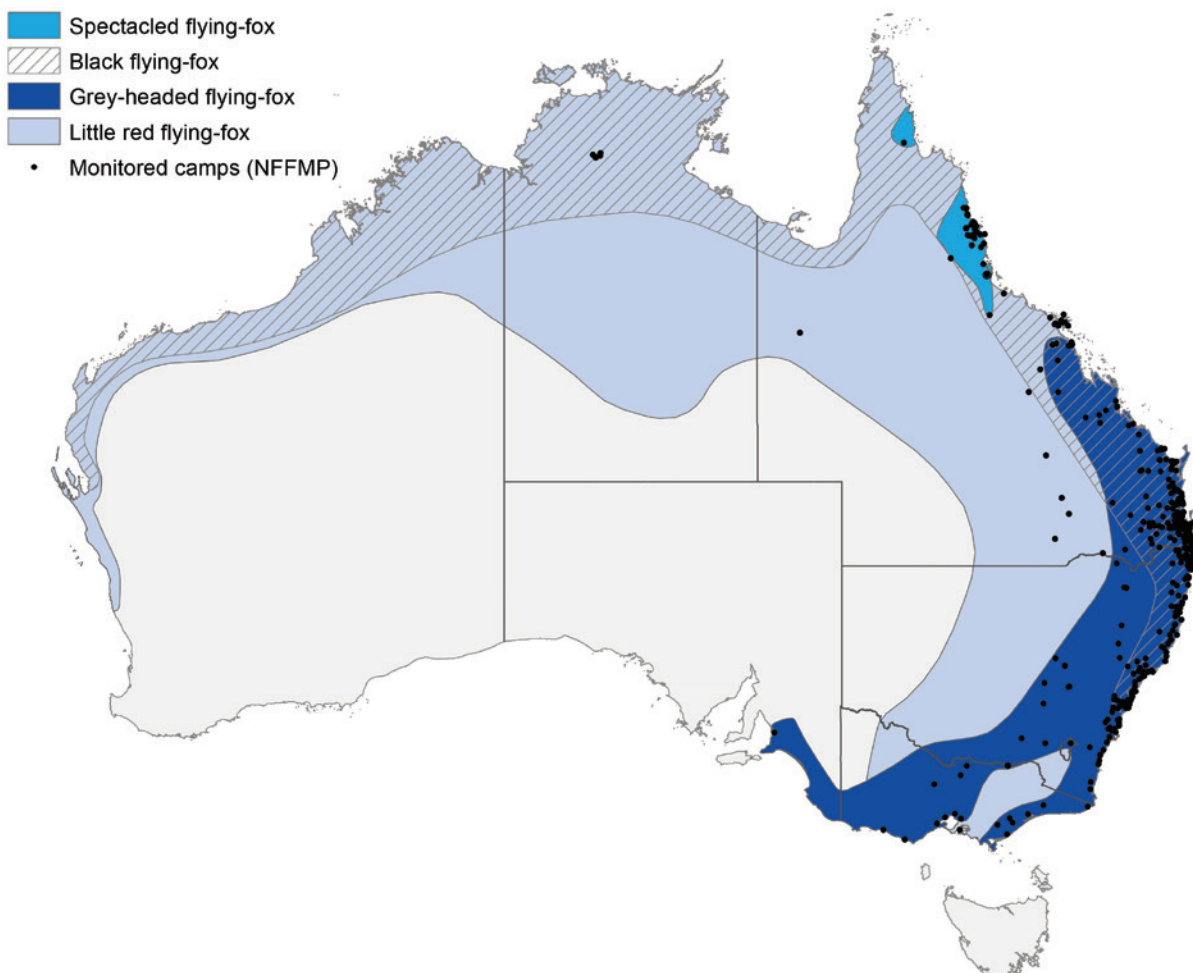


Figure 1 – The distribution of Australia's four mainland flying-fox species (shaded or hatched areas) and the 456 camps monitored as part of the National Flying-fox Monitoring Program (black points).

Key Findings

- We conducted 15 interviews with managers who were selected to capture variation in geographic areas, camp histories etc., and received 54 responses to our questionnaires. Together, they commented on the management of 47 camps. Responses came from Queensland (23 camps), New South Wales (19 camps), Victoria (4 camps), and South Australia (1 camp).
- Multiple species occupied at least 27 of the camps, while the remaining 20 were thought to be used by only a single species or were unoccupied at the time of the survey. The most common was the grey-headed flying-fox (30 camps), followed by the black flying-fox (25 camps), little red flying-fox (18 camps), and spectacled flying-fox (2 camps).
- Managers cited complaints from residents as the primary reason for intervening at flying-fox camps. Other key influencers included vocal stakeholders, some of whom lived close to the camp, and the media. Respondents indicated that 11 (or 23%) of the camps that they were responsible for were not being managed beyond typical maintenance activities.
- The most common approaches used at actively managed camps were:
 - » Education and awareness (30 camps)
 - » Creating buffers between the roost and affected properties by vegetation clearing or using deterrents (26 camps)
 - » Indirectly dispersing the camp using vegetation removal (12 camps)
 - » Actively dispersing the camp using disturbances such as sound and light (12 camps)
- Perceived effectiveness (scored from 1-7, or from not effective to very effective) varied greatly: approaches that worked in one context were often ineffective in another. Therefore, the context of the camp location, history, and the community's objectives should be factored into any decisions about what to do.
- There is little long-term planning being done at the local government level to address these issues: >80% of agencies did not have guidelines or policies relevant to developments near flying-fox camps, and few agencies were creating alternative flying-fox habitat.

Education and awareness

- Involves providing information to the public about flying-foxes, and collecting feedback from the community.
- Typical cost: range \$150–\$40,000, median \$3,250.
- Perceived effectiveness: Low.
- Pros: Can be effective at alleviating fears about disease transmission.
- Cons: This action had received the lowest investment compared to other actions, was often done in an ad-hoc or reactive way, and by managers who appear to have had little training in stakeholder engagement.

Buffers

- Involves discouraging bats from roosting in the area bordering the camp by removing vegetation or deploying deterrents such as sprinklers.
- Typical cost: range for vegetation buffers \$2,000–\$80,000, median \$38,000; range for deterrent buffers \$12,000 – \$33,000, median \$17,000.
- Perceived effectiveness: Moderate.
- Pros: Shifts the impacts away from residents and managers are seen to be proactively addressing the issue.
- Cons: For vegetation buffers some residents may resent any impacts on amenity caused by loss of trees and other vegetation. Also, the cumulative impacts of buffers may contribute to ongoing habitat loss for flying-foxes.

Indirect dispersal

- Involves removing vegetation when the bats are not using the camp to stop it from re-establishing.
- Typical cost: range \$5,000–\$56,000, median \$30,000.
- Perceived effectiveness: Moderate.
- Pros: Shifts the impacts away from residents and managers are seen to be proactively addressing the issue. Lower risk of bats returning to site (compared with direct dispersal).
- Cons: Residents may resent the impacts on amenity caused by loss of trees and other vegetation. The cumulative impacts of vegetation removal may contribute to ongoing habitat loss for flying-foxes.

Active dispersal

- Involves creating disturbances such as noise when the bats are returning from feeding to discourage them from roosting at the camp.
- Typical cost: range \$10,000–\$2 million, median \$23,000.
- Perceived effectiveness: Moderate.
- Pros: Managers are seen to be proactively addressing the issue. Reduced complaints, improved amenity and shifted the location of the camp.
- Cons: Potential for formation of ‘splinter camps’ in locations that create even greater conflict, or movement to camps in other problematic locations. In 83% of cases flying-foxes returned to site after dispersal. The most successful dispersals required substantial resources and sustained time investments.

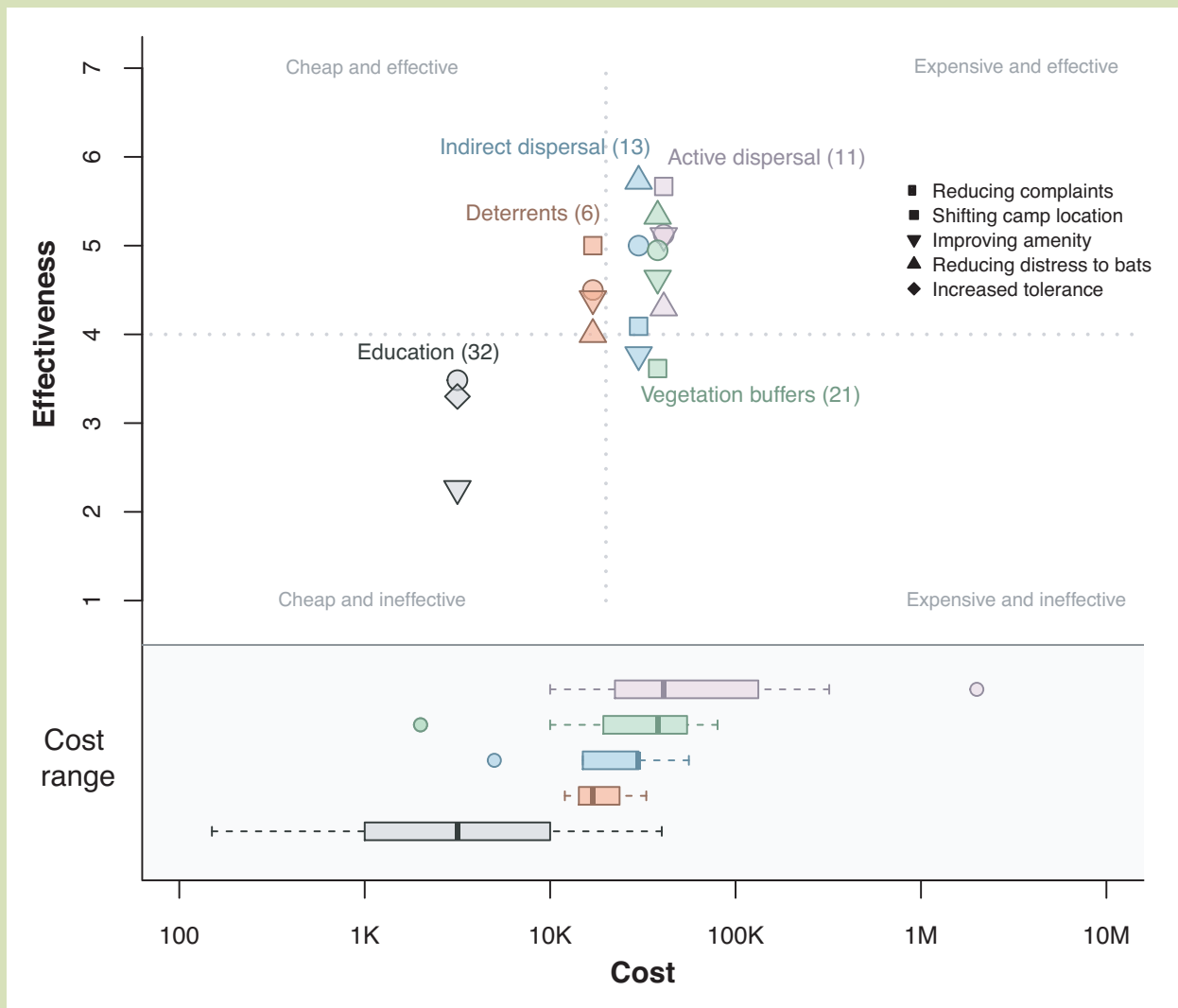


Figure 2 – Summary of perceived effectiveness versus cost for each management approach across a range of objectives.

Approaches are shown in different colours (no. of respondents in brackets), and symbols indicate what management objective it was scored against (e.g. reduce complaints, improve amenity). Each approach and objective is plotted against the median cost on the x-axis and median perceived effectiveness on the y-axis (ranging from 1 = not effective to 7 = very effective). Overall median effectiveness and cost are shown as dotted grey lines. The full range of cost estimates provided for each approach are plotted at the bottom as box plots, with statistical outliers shown as circles. Extra detail on the perceived effectiveness of each approach for each objective are provided in Figure 6.

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.

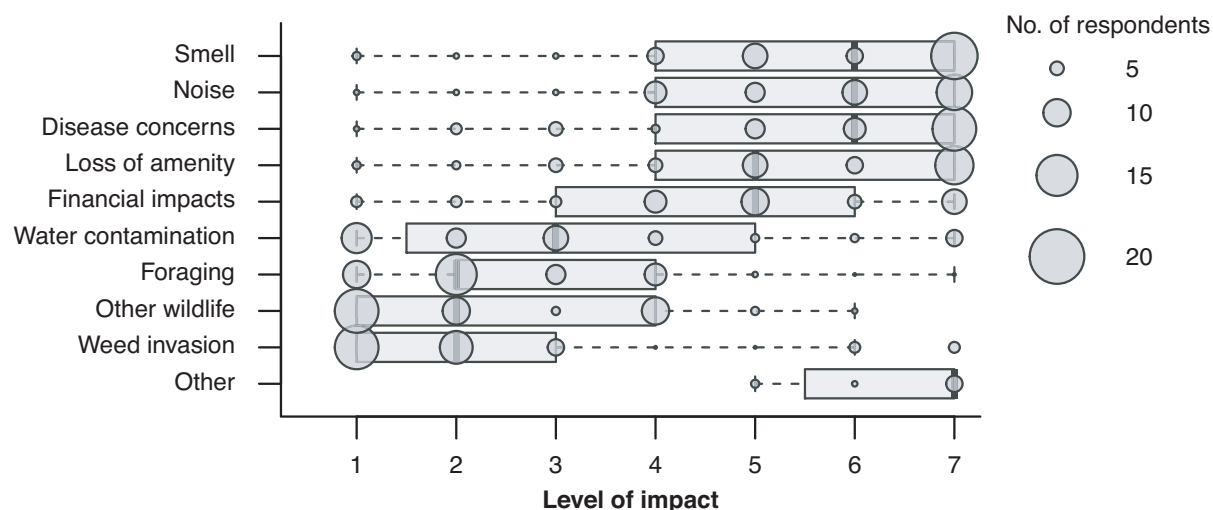


Figure 3 – Perceived level of impacts of flying-fox camps on local communities and the environment

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 or '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"

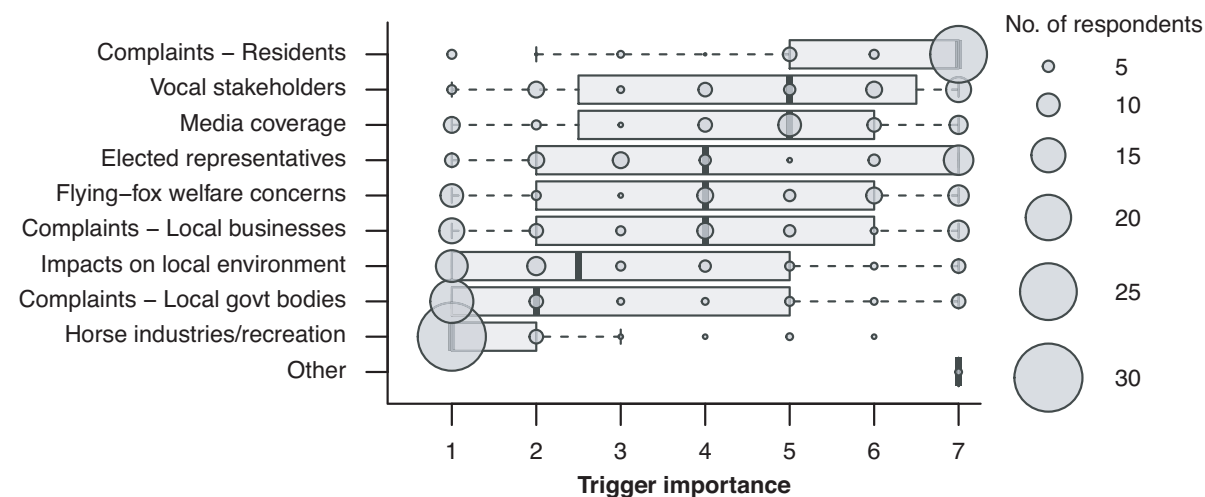


Figure 4 – Perceived importance of different triggers in the decision to manage a camp (beyond status quo maintenance)

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.

Management strategies being used

The most commonly-implemented approach across the 47 camps that respondents provided data on was education or some form of community engagement (30 camps) though in many cases a combination of approaches was used. Education alone was being used at 9 camps, and education plus vegetation buffers at a further 8 camps. 'No action' (i.e. no active management) was being undertaken at 11 camps. Some form of camp-based management (buffers, vegetation removal, or dispersal) had been implemented at 26 camps. Alternative management approaches mentioned during the interviews including culling, the provision of artificial roosting habitat or noise attenuation fencing had not been used by respondents.

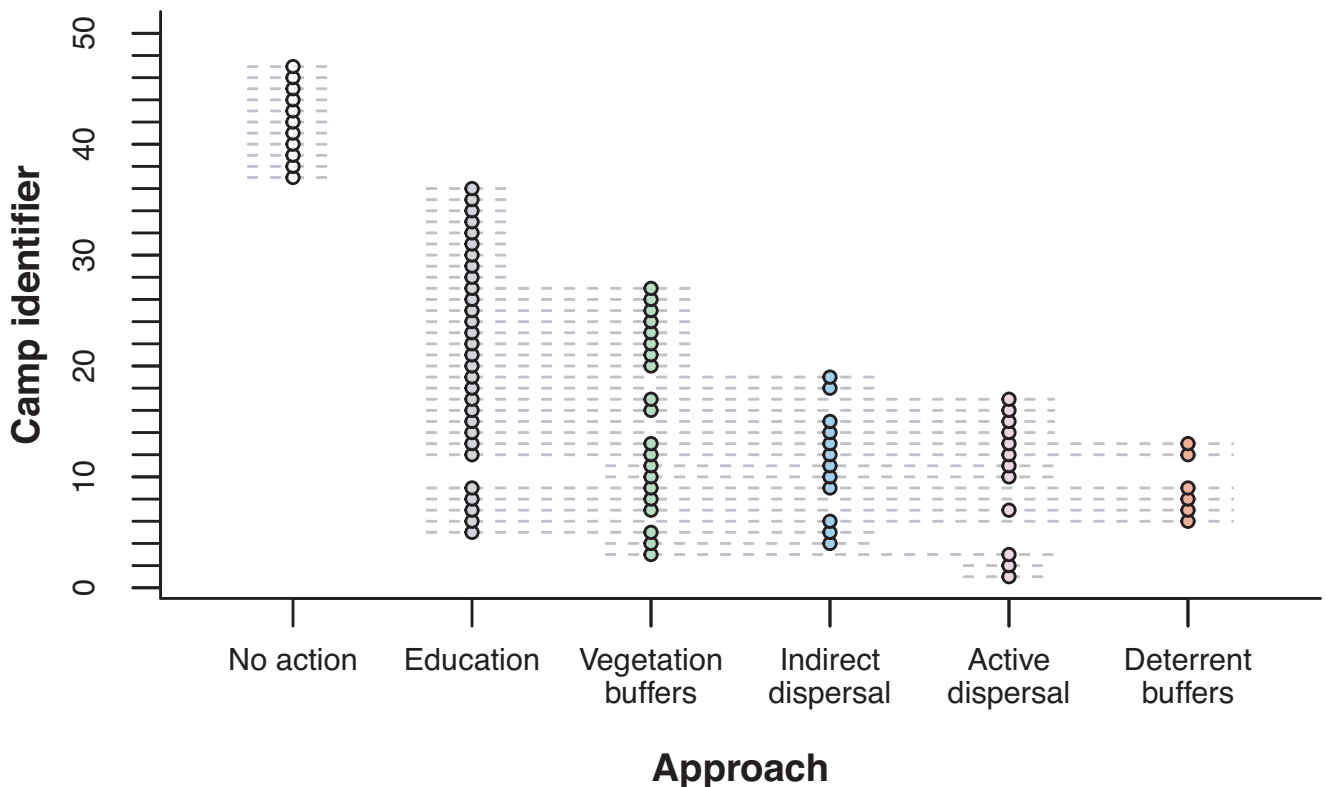


Figure 5 – Management approaches used at flying-fox camps

Each point along the vertical axis represents a single camp (which have been given unique identifier), and camps where a combination of multiple approaches have been used are connected by the dashed grey lines. Each approach is shown in a different colour. For example, the topmost 13 white circles show "no action" alone was used at the camps, the following 10 grey circles show education only being used, and then the 8 camps below that show a combination of education (grey circles) and vegetation buffers (green circles) being used.



Grey-headed flying-fox.
Photo: Andrew Mercer
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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 ..."

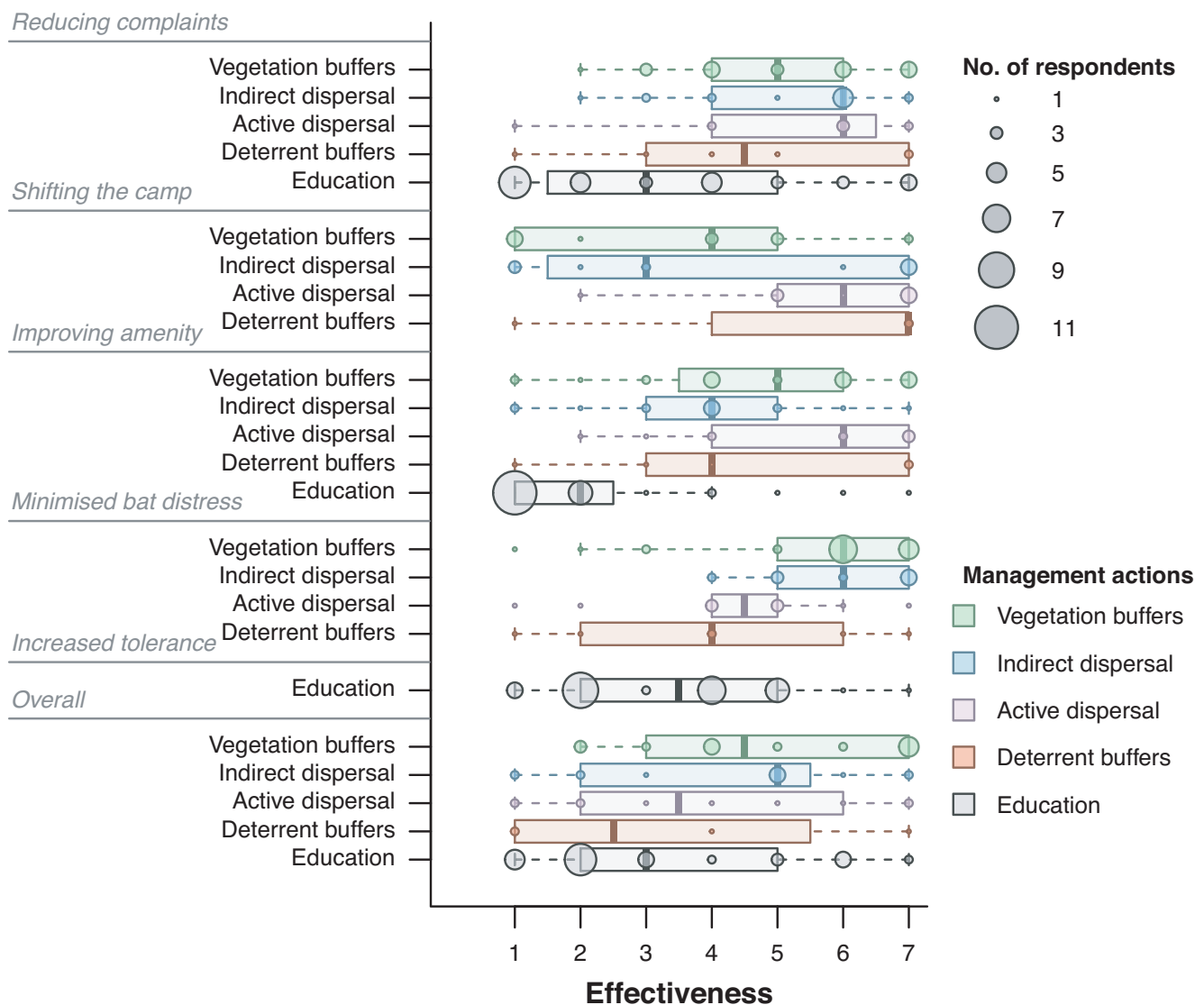


Figure 6 – Perceived effectiveness of management approaches, scored against a range of objectives.

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.

Stakeholder education and awareness

The aim of these activities is to inform the public about flying-fox ecology, disease risks, and management. They are also an opportunity to hear community perspectives and collect feedback.

Education and awareness-raising activities were undertaken at 83% of the 36 actively managed flying-fox camps, though land managers did not consider them to be very effective. A range of activities had been tried, including providing information letters or brochures (10 camps), phone or face-to-face conversations (9 camps) and information sessions (8 camps) amongst many others.

Potential reasons cited by managers for perceived low-effectiveness include:

- Activities were often carried out in a reactive way, on an ad hoc basis, and with little resourcing.
- Activities may not have been tailored to reach all relevant stakeholders.
- It was difficult to counter unrealistic expectations and engage those with strong views.
- It was hard to keep pace with the dynamic and unpredictable nature of camp occupancy.
- The activities were inadequately funded, there were time constraints, and managers appear to have had little or no training in engagement and social science approaches.

However, education was particularly effective in reducing concerns about disease transmission, and many people responded positively to direct engagement:

"When you talk to them and explain to them what's happening, they're very, very good and a lot of people have actually said, 'Oh, if I would have known that they're only going to be here for maybe six weeks, I can cope with that.'"

Many managers believe early engagement leads to greater success, so strategies need to be pro-active and have the capacity for reaching the right people at the right time. Conflict may in some instances be avoided or reduced if new residents were provided with the appropriate information. As stated by one land manager:

"with a change in attitude, you may not need to do anything to the camp"

Managers would also likely benefit from increased sharing of educational materials for adaptation and reuse.

Creation of buffers by removing vegetation

This 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.

This was the second most commonly used management action. Buffers were perceived to be moderately to very effective in reducing complaints and increasing amenity, and in not causing distress to flying-foxes.

Factors to consider:

- Stakeholders may prefer the vegetation to remain and the flying-foxes be dispersed. Others may not be overly concerned by the flying-foxes and value the vegetation:

"Many residents liked the bats and did not want to lose the vegetation"

- The width of the buffers may not adequately mitigate the impacts; the majority of buffers were described as being between 10 - 50 m wide.
- Buffers are less effective when flying-foxes become highly abundant:

"I think it's a situation where most of the time (buffers) are helpful, but when we get big numbers then I don't think it can really help that ... it'll help to some degree but it won't resolve all issues"

- The creation of buffers reduces the size of roost habitat and this can cause spillovers into new areas in times when flying-fox numbers increase.
- The potential cumulative effects of loss of habitat through the creation of buffers are substantial: between them, agencies had cleared approximately 18 ha of roost habitat in the previous 5 years.

Indirect dispersal by removing vegetation

This approach is commonly called 'passive dispersal' and involves the removal of the vegetation in the camp when the bats are not present. This stops the camp from re-establishing because they have nowhere to land, or the conditions are unsuitable.

This action was considered to be quite effective in reducing complaints and not causing distress to flying-foxes, but less effective than the creation of buffers in improving amenity.

Factors to consider:

- Passive dispersal can be moderately effective, but bats may not establish in a 'better' location.
- It does require substantial removal/modification of the vegetation:

"...Unless you're removing almost all of the vegetation in a flying fox camp, your dispersal's not going to work and often the community doesn't want to remove the vegetation because they actually like it."

Active dispersal

This involves creating disturbances such as noise, smoke, water and light when the bats return from feeding. The aim is to discourage the flying-foxes from roosting in the immediate area at all.

Land managers who used active dispersal considered it to be effective at reducing complaints, improving amenity and shifting the location of the camp. However, there was considerable variability in perceptions of the degree of distress dispersal causes flying-foxes, and opinions were quite divided regarding overall effectiveness. Of the 12 respondents who replied to a question about long-term effectiveness, 10 indicated the flying-foxes had returned to the site, and 8 indicated they had or were considering undertaking further dispersal actions.

Factors to consider:

- Dispersals can be successful, but might just be short-term or shift bats that are about to move on anyway:

"I know it was kind of a cheat because like, they were going to leave anyway, they would've been there for a week, like two weeks, and then left..."

- It's often less of a 'dispersal' and more of a 'nudge':

"...they really didn't go far in the dispersal. The dispersal got them out of (location) but they ended up at (another location) which is only a couple of kilometres away ..."

- There can be negligible, and even negative outcomes:

"Both dispersals (at location) just failed. One lasted four weeks and the other one lasted four days. This year is the first year they naturally abandoned but they came back after five weeks ..."

Creation of buffers using deterrents

This involves deploying deterrents in vegetation that borders on houses and other buildings, to stop bats from roosting in those trees. This approach was rare. Most respondents did not provide any detail on what deterrents were used, though in one instance it was low levels of smoke and noise, and in another it was sprinklers. The land manager considered sprinklers to be very effective because they do not necessarily require the removal of vegetation, yet have the same effect of deterring flying-foxes from roosting in certain trees.



Flying-fox.
Photo: Daniel Vianna
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Constraints to implementation

Almost half of land managers stated that other management actions (i.e. in addition to what they had already tried) had been seriously considered, but were unable to be implemented because of a range of factors:

- Limited funding or resources:
"We don't manage any other wildlife. From an expertise perspective, we need more skills to be able to deal with this appropriately. And ... we don't have a budget for managing bats."
- Community opposition to proposed actions:
"We did limited vegetation management... because there was so much community opposition"
- Concerns about welfare of flying-foxes, site condition, diseases, and the legality of actions.
- Concerns that actions could have negative consequences:
"It's just that we are very limited in what we can do... we also have to be so cautious ... in relation to what we do because... if we do something that nudges those flying-foxes, we might nudge them into private property, so that's something that we have to be very, very cautious of."

Other useful resources

- OEH (2016) Flying-fox Camp Management Plan Template 2016. Office of Environment and Heritage, Sydney, Australia.
<http://www.environment.nsw.gov.au/publications/nativeanimals/flying-fox-camp-management-plan-template-160240.htm>
- Lentini, PE and Welbergen, JA (2016). Managing tensions around urban flying-fox roosts.
Ecological Society of Australia Hot Topics,
<https://www.ecolsoc.org.au/hot-topics/managing-tensions-around-urban-flying-fox-roosts>.
- National Flying-fox Monitoring Program:
<http://www.environment.gov.au/biodiversity/threatened/species/flying-fox-monitoring>



Black flying-foxes. Photo: Gail Hampshire
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Further information:

<http://www.nespthreatenedspecies.edu.au/>

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