Redland CITY COUNCIL

Redlands Coast Flying-fox Plan

2022

This document has been produced by Ecosure Pty Ltd for Redland City Council

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Foreword

The Redlands Coast is renowned for its outstanding cultural and natural values. These values are at the core of what makes Redlands Coast such a special place to live and work, and attract thousands of visitors to our naturally wonderful area each year.

Redland City Council is committed to protecting our natural environment and the lifestyles of communities, as reflected in *Our Future Redlands – A Corporate Plan to 2026 and Beyond* which describes seven strategic themes:

- City leadership
- Strong communities
- Quandamooka Country
- Natural environment
- Liveable neighbourhoods
- Thriving economy
- Efficient and effective organisation.

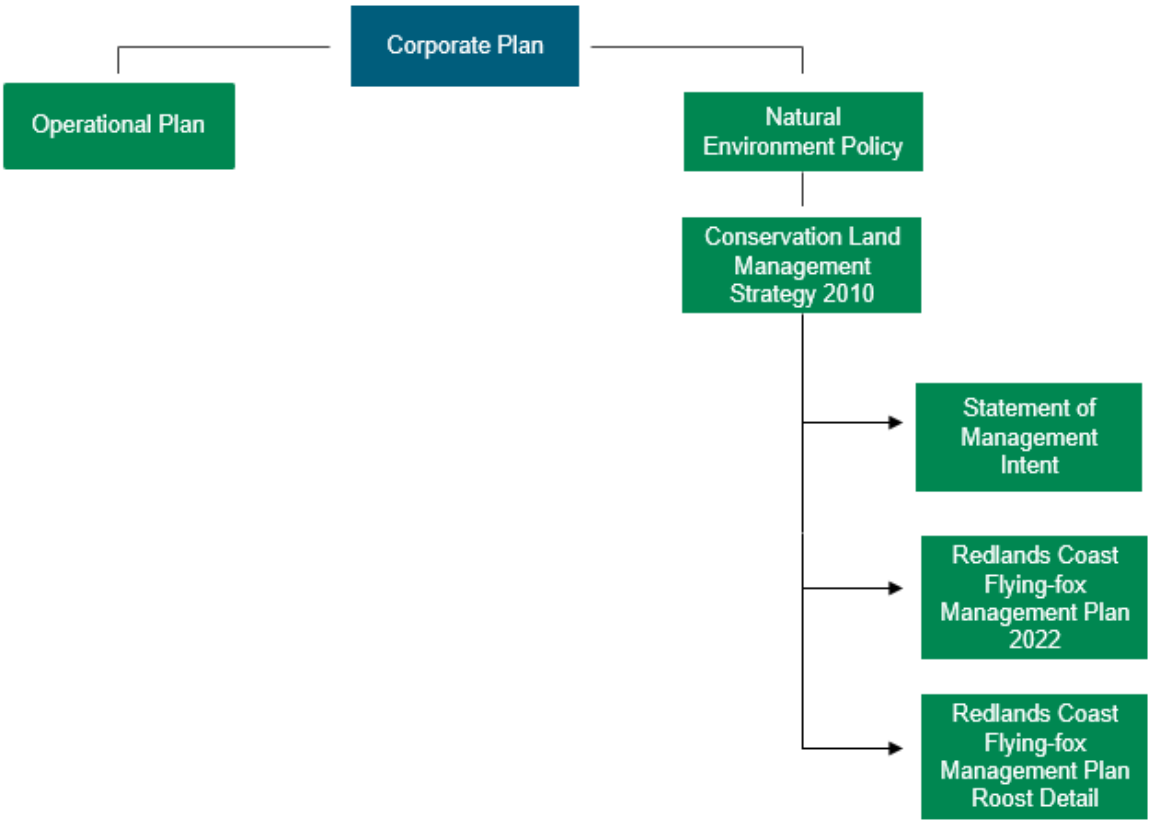
Council recognises the critical role that flying-foxes play in conserving the natural environment and biodiversity through seed dispersal and pollination. We encourage communities to embrace living with nature and wildlife but also recognise that living with wildlife can present its challenges. This Redlands Coast Flying-fox Management Plan has been developed as a framework to support communities living with flying-foxes while protecting flying-foxes and the critical ecosystem services they provide. In doing so, it will support achieving our goals of strong communities, liveable neighbourhoods and protecting the natural environment.

On behalf of Council we extend our thanks to everyone who contributed to the development of this plan and, as we move into implementation, we encourage you to join us in taking positive action to protect the values that make Redland Coast naturally wonderful.

Karen Williams

Mayor – Redland City Council

Head of Power



Acknowledgements

Redland City Council acknowledges the Quandamooka People as the Traditional Owners of much of the Redlands Coast. Council also extends its acknowledgement of Traditional Owners to the Danggan Balun (Five Rivers) People who are currently in the process of Native Title determination for an area that crosses into southern Redlands Coast. We acknowledge the Elders past, present and emerging and acknowledge the spirits and ancestors of the Clans that lived in this area.

We thank the Queensland Government for funding support to develop this Plan and for its early implementation through the Flying-fox Roost Management in Queensland Program.

A special thanks to everyone who took the time to complete the community survey to inform the draft Plan, and other stakeholders who provided their input and expertise during development of the Plan. We also gratefully acknowledge the Queensland Herbarium/Department of Environment and Science/CSIRO for sharing information and spatial data on flying-fox foraging resources in the area.

Little red flying-foxes (*Pteropus scapulatus*)

Summary

Flying-foxes are keystone species for their critical role in long-distance pollination and seed dispersal, ecosystem services that are particularly important over fragmented landscapes and to allow forests to adapt to threats such as climate change.

Three flying-fox species visit the Redlands Coast at different times of the year: the grey-headed flying-fox (*Pteropus poliocephalus*), black flying-fox (*P. alecto*) and little red flying-fox (*P. scapulatus*). All species and their habitats are protected in Queensland under the *Nature Conservation Act 1992*. The grey-headed flying-fox is protected under the Commonwealth *Environment Protection and Biodiversity Act 1999* as a threatened species.

Flying-foxes are highly mobile and nomadic, each species considered to have a single national population. They move across their national range between a network of roosts following seasonal flowering and fruiting resources. Roosting and foraging in urban areas is becoming more common, largely due to habitat loss, and urban areas providing reliable year-round food resources and more stable conditions.

There are currently 32 known flying-fox roosts (2022) on the Redlands Coast, most within the urban footprint. The majority of these are occupied on a temporary or seasonal basis and flying-foxes will continue to return to established roosts. Favourable habitat, which is important to other native wildlife and community amenity, mean that roosts may establish in new locations.

Living near a flying-fox roost can be challenging for some, with impacts associated with noise, odour, faecal drop, damage to vegetation, property and concern about human and animal health. There are challenges associated with management. Authorisation under legislation is required to manage roost habitat. Attempts to relocate flying-foxes are extremely costly, and often splinter a roost to multiple undesirable locations that are difficult to predict. Flying-foxes will regularly attempt to recolonise their preferred roost site when resources are available so the outcomes of dispersal attempts are usually very short-term. For these reasons, Redland City Council does not support dispersal as a management option. Council has a Statement of Management Intent (SoMI) that lays out the management intent for existing and new roosts for the community.

This Redlands Coast Flying-fox Management Plan provides a framework for Council to respond to community concerns. It sets out impact mitigation strategies and how Council will make decisions about managing flying-fox impacts using a transparent decision framework. It provides actions to ensure flying-foxes and their critical ecological services are conserved on the Redlands Coast to support and provide management direction for Council's endorsed SoMI. Objectives of the Plan are to:

1. Address concerns of residents experiencing lifestyle impacts associated with living in close proximity to flying-fox roosts on Council land.
2. Develop flying-fox management strategies consistent with legislative obligations.

3. Increase community understanding and appreciation of the essential ecological role of flying-foxes and the need for conservation efforts.
4. Develop information management strategies to ensure community access to accurate and up-to-date information relating to perceived health risks.
5. Increase Council's understanding of flying-fox behaviour through monitoring and research and ensure management practices align with most recent knowledge.
6. Develop achievable flying-fox conservation strategies to protect the three species found on the Redlands Coast.
7. Identify and where possible prevent future residential/flying-fox land use conflict issues.
8. Meet requirements of a Flying-Fox Roost Management Plan to be endorsed by DES that provides support and management direction for Council's endorsed SoMI.

There is a range of stakeholders with an interest in flying-foxes on the Redland Coast including the Quandamooka People, residents and business owners, other community groups including service providers and volunteers, conservation and rescue groups, researchers, Redlands Coast visitors, surrounding councils and State and Commonwealth governments.

Feedback has been sought from these stakeholders through consultation during development of the Plan.

Community engagement during development of the Plan was through an online survey and public exhibition period, building on many years of collecting information from the community.

Stakeholder and community feedback has been incorporated where possible in developing the management framework and action plan. Further consultation with impacted communities will be undertaken during Plan implementation.

In line with community feedback, stakeholder input, legislation and best practice, roosts are categorised using a framework that considers community impacts and number of residences in the area, proximity to a roost, sensitive receptors (e.g. schools, aged care), sensitive businesses, flying-fox occupancy at the roost (numbers, density, how often they visit) and land tenure. A separate, supplementary document - Redlands Coast Flying-fox Management Plan Roost Detail - provides a profile of each known roost with background information including site context, roost history, other ecological values, proximity to residents and sensitive receptors.

Potentially suitable management, evidence-based options are assigned based on roost category and may include:

- Education and awareness programs
- Habitat improvement in low conflict areas
- Property modification
- Considerate land use planning

- Supporting research, particularly research to improves mitigation of amenity issues
- Routine maintenance activities
- Alternative habitat creation
- Protocols to avoid incidents
- Noise attenuation fencing (permanent or temporary)
- Buffers through vegetation trimming, weed removal or canopy-mounted sprinklers
- Subsidy programs to assist with additional services or property modification
- Early intervention to deter a roost from establishing (new / pop-up sites only).

Council will provide information and advice to any community members impacted by roosting flying-foxes, however will only actively manage roosts on Council land. Council will adopt a hierarchical approach to management where possible, beginning with options that least impact on the roost environment. At each stage Council will assess outcomes against objectives of the Plan before deciding whether to progress to further stages.

The Plan is an adaptive document that can be updated as situations change, or research improves our understanding of flying-foxes and managing community impacts.

Acronyms and abbreviations

ABLV	Australian bat lyssavirus
ACP Act	*Animal Care and Protection Act 2001* (Queensland)
BAU	Business as usual
BFF	Black flying-fox (*Pteropus alecto*)
CASA	Civil Aviation Safety Authority
CEP	Community engagement plan
COP	Code of Practice
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DES	Department of Environment and Science
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EVNT	Endangered, vulnerable and near threatened
FFRMP	Flying-fox roost management permit
GHFF	Grey-headed flying-fox (*P. poliocephalus*)
HeV	Hendra virus
LGA	Local government area
Low impact COP	*Code of Practice – Low impact activities affecting flying-fox roosts* (DES 2020a)
LRFF	Little red flying-foxes (*P. scapulatus*)
MNES	Matters of national environmental significance
NC Act	*Nature Conservation Act 1992* (Queensland)
the Plan	This Redlands Coast Flying-fox Management Plan
PPE	Personal protective equipment
RE	Regional Ecosystem
Roost Management COP	*Code of Practice – Ecologically sustainable management of flying-fox roosts* (DES 2020b)
QYAC	Quandamooka Yoolooburrabee Aboriginal Corporation
SEQ	South East Queensland
SoMI	Statement of Management Intent
UFFMA	Urban Flying-fox Management Areas
VM Act	*Vegetation Management Act 1999* (Queensland)
WHA	Wildlife Health Australia

Redland City Council Departments

Acronym	Group	Acronym	Unit or Team
CAG	City Assets Group	CTIAMU	Civil and Traffic Infrastructure Asset Management Unit
		COSAMU	Civic and Open Spaces Asset Management Unit
CCSG	Customer and Cultural Services Group	RPAC	Redlands Performing Arts Centre
			Library Services
		ICCC	Integrated Customer Contact Centre
CEDG	Community and Economic Development Group		Strengthening Communities
			Strategic Economic Development
CETG	Communication, Engagement and Tourism Group	MDDU	Marketing and Digital Design Unit
		MCEU	Media Communication Engagement Unit
		TEU	Tourism and Events Unit
CGG	Corporate Governance Group		
COG	City Operations Group	RDMU	Roads, Drainage and Marine Unit
		PCSU	Parks and Conservation Services Unit
		FSU	Facilities Service Unit
CPAG	City Planning and Assessment Group	SPU	Strategic Planning Unit
		EngEU	Engineering and Environment Unit
		PAU	Planning Assessment Unit
		TPU	Transport Planning Unit
		IPCU	Infrastructure Planning and Charging Unit
CSG	Corporate Services Group	IPP	Indigenous Partnership and Programs
		BID	Business Innovation and Development
		BIS	Business Information Systems
ERG	Environment and Regulation Group	EEU	Environment and Education Unit
		EP	Environmental Partnerships
		DCU	Development Control Unit
		CSU	Compliance Services Unit
		SPU	Strategic Property Unit
GCG	General Council Group		Risk and Liability Services
			Procurement and Warehousing
PDG	Project Delivery Group		Infrastructure Projects
			Construction Projects
			Design and Technical Services
			Survey Services Unit
			Strengthening Communities
SAPMG	Strategic Assets and Portfolio Management Group	AMU	Asset Management

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1 Introduction

Redland City local government area (LGA) covers 537 km^2 along the southern coast of Moreton Bay in South-east Queensland, approximately 26 km from the Brisbane CBD. The estimated population of Redland City at the end of June 2020 was 160,331 (Australian Bureau of Statistics 2021). This is projected to increase to 192,431 by 2041 (Queensland Treasury 2018). Redlands has both mainland and island communities, and is made up of developed urban areas, and rural and bushland areas.

Three flying-fox species call the Redlands Coast home at certain times of the year:

- Grey-headed flying-fox (*Pteropus poliocephalus*) (GHFF)
- Black flying-fox (*P. alecto*) (BFF)
- Little red flying-fox (*P. scapulatus*) (LRFF).

Flying-foxes are keystone species for their critical role in long-distance pollination and seed dispersal, which is particularly important over fragmented landscapes. All species and their habitats are protected in Queensland under the *Nature Conservation Act 1992* (NC Act), administered by the Department of Environment and Science (DES). The GHFF is protected under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act) as a threatened species due to population decline and ongoing threats. The legislative framework is summarised in Appendix 1, and strategic linkages in Appendix 2.

Flying-foxes are highly mobile and nomadic, each species considered to have a single national population. They move across their national range between a network of roosts or camps[1] following seasonal flowering and fruiting resources. Roosting and foraging in urban areas is becoming more common, largely due to habitat loss, and urban areas providing reliable year-round food resources and more stable conditions. Over time traditional large flying-fox roosts have become fragmented and replaced with roosts in smaller patches of habitat, many in urban areas.

There are currently 32 known flying-fox roosts on the Redlands Coast (2022), most within the urban footprint (Figure 1). The majority of these are occupied on a temporary or seasonal basis and flying-foxes will continue to return to established roosts. Favourable habitat (including critical winter food resources for the GHFF) within the Redlands, which is important to other native wildlife and community amenity, mean that roosts may establish in new locations.

Living near a flying-fox roost can be challenging for some, with impacts associated with noise, odour, faecal drop, damage to vegetation, property and concern about human and animal health. There are challenges associated with management. Authorisation under legislation is required to manage roost habitat. Attempts to relocate flying-foxes are extremely costly, and

[1] Hereafter collectively referred to as roosts, although legislative differences between these terms are noted and outlined in Appendix 1.

often splinter a roost to multiple undesirable locations that are difficult to predict. Flying-foxes will regularly attempt to recolonise their preferred roost site when resources are available so the outcomes of dispersal attempts are usually very short-term. For these reasons, Redland City Council (Council) does not support dispersal as a management option. Council has a Statement of Management Intent that lays out the management intent for existing and new roosts for the community, which is attached in Appendix 3.

This Redlands Coast Flying-fox Management Plan (the Plan) provides a framework for Council to respond to community concerns. It sets out impact mitigation strategies and how Council will make decisions about managing flying-fox impacts using a transparent decision framework. It provides actions to ensure flying-foxes and their critical ecological services are conserved on the Redlands Coast to support and provide management direction for Council's endorsed SoMI.

The Plan and supplementary Roost Detail document profile each known roost including site context, roost history, other ecological values, proximity to residents and sensitive receptors. These site-specific aspects have been, and will continue to be, considered in determining appropriate management and conservation actions for each roost.

The Plan is an adaptive document that can be updated as situations change, or research improves our understanding of flying-foxes and managing community impacts.

Figure 1: Regional Context

Redland City Council

Flying-fox Management Plan

Flying-fox roosts

Redland City Council LGA

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1.1 Objectives

Objectives of the Plan are to:

1. Address concerns of residents experiencing lifestyle impacts associated with living in close proximity to flying-fox roosts on Council land.
2. Develop flying-fox management strategies consistent with legislative obligations.
3. Increase community understanding and appreciation of the essential ecological role of flying-foxes and the need for conservation efforts.
4. Develop information management strategies to ensure community access to accurate and up-to-date information relating to perceived health risks.
5. Increase Council's understanding of flying-fox behaviour through monitoring and research and ensure management practices align with most recent knowledge.
6. Develop achievable flying-fox conservation strategies to protect the three species found on the Redlands Coast.
7. Identify and where possible prevent future residential/flying-fox land use conflict issues.
8. Meet requirements of a Flying-Fox Roost Management Plan to be endorsed by DES that provides support and management direction for Council's endorsed SoMI.

1.2 Stakeholders

Stakeholders with an interest in flying-foxes on the Redlands Coast are shown in Table 1. Feedback has been sought from these stakeholders through consultation during development of the Plan. Community engagement is summarised in Section 3. Consultation with other stakeholders was one-on-one with group representatives and information has been incorporated into the Plan.

Table 1 Stakeholders and interests

Stakeholder group	Stakeholder	Interests / potential or reported impacts
Community	Traditional Owners and Custodians	The Quandamooka People have been the Traditional Owners of much of the area now known as Redlands Coast for more than 21,000 years. Traditional Owners and Custodians have an interest in flying-foxes, including the ecological services they provide and the potential for sustainable harvesting for food or medicinal purposes. Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC) is the prescribed body corporate working for the Quandamooka People.
	Residents and business owners	Residents and businesses located near roosts are primarily affected by smell, noise and faecal drop.
	Schools and day care centres	Where roosts are nearby these may be affected by noise, smell, faecal drop and the potential for injured or orphaned flying-foxes on school grounds. There is an opportunity to teach students about the ecological value of flying-foxes and appropriate behaviour around

Stakeholder group	Stakeholder	Interests / potential or reported impacts
		flying-foxes and other wildlife. A number of quality educational resources are publicly available that have been developed in line with the Queensland school curriculum.
	Hospitals	Hospitals and medical centres may provide lyssavirus vaccinations. Potential concern regarding establishment of roosts in their vicinity, including if established roosts are moved on.
	Orchardists and fruit growers	Growers may be impacted by flying-foxes feeding on fruit in orchards, and should have access to safe-netting guidelines and information about grants.
	Visitors and tourists	The Redlands Coast is a popular destination and provides opportunities for ecotourism and potential for growth in the ecotourism industry.
	Recreation and sports clubs	Golf courses etc. may require advice regarding permissible maintenance activities around flying-foxes.
	Veterinarians, horse owners and equine facilities	Horse owners, equine facility managers and local veterinarians should be aware that Hendra virus risk is associated with foraging flying-foxes (i.e. present across the entire flying-fox range), and appropriate mitigation measures.
	Airports / Aerodromes / Air ambulance	Aerodrome managers and pilots have a responsibility to reduce the risk of wildlife-aircraft strike. Any hospital near a roost that accepts medical flights (e.g. Redlands Hospital) must also be aware of flying-fox movements.
Government	Council	Council has responsibility for land use planning, management of public land and community care. Council has discretionary responsibility for the management of flying-fox colonies on Council owned (freehold) and Council managed (trustee) land for management in line with legislation, operational requirements, scientific evidence, best practice and community expectations. Council has an adopted SoMI that lays out the management intent for existing and new roosts for the community (see Appendix 3).
	Redlands 24 hr Wildlife Rescue service	Council operates a 24 hr Wildlife Rescue Service with dedicated volunteers. Flying-fox calls are directed to Bat Conservation and Rescue Qld Inc (BCRQ) with rescuers vaccinated and trained in flying-fox rescue.
	Surrounding councils	Flying-foxes are highly mobile and management decisions on the Redlands Coast have potential to influence other councils. Insights from the experiences of other councils will also be considered in developing the Plan.
	Queensland DES	DES is responsible for administering the NC Act and is the regulating authority for flying-fox management in Queensland. DES administered the Queensland government grant which allowed this Plan to be developed and to support early implementation.
	Biosecurity Queensland	Biosecurity Queensland is responsible for coordinating efforts to prevent, respond to and recover from biosecurity issues such as Hendra virus and Australian Bat Lyssavirus.
	Queensland Health	Queensland Health is responsible to respond to notifiable diseases, including Australian Bat lyssavirus and Hendra virus.

Stakeholder group	Stakeholder	Interests / potential or reported impacts
	Commonwealth Department of Agriculture, Water and the Environment (DAWE)	DAWE has the regulatory responsibility for the protection of matters of national environmental significance (MNES), such as the threatened GHFF, through administering the EPBC Act. Any action likely to have a significant impact on an MNES requires approval from the Australian Minister for the Environment.
	Local Government Association of Queensland (LGAQ)	LGAQ is an industry association that represents the interests of Queensland councils and assisted establishing the Flying-fox Grant Program for councils to assist their communities.
Service providers	Energy providers	Flying-fox collisions with power lines and telecommunications towers are a threat to flying-foxes, and may cause service interruptions.
	Telecommunications providers	
Non-government	Researchers/ universities/CSIRO	Researchers have an interest in flying-fox behaviour, biology and conservation. CSIRO coordinates the National Flying-fox Monitoring Program (NFFMP) and analyses population data.
	Conservation and rescue groups	Wildlife carers and conservation groups such as BCRQ, Friends of Black Swamp and Bushcare, have an interest in flying-foxes and their habitat, and volunteers make a significant contribution to conservation.

2 Flying-foxes on the Redlands Coast

The Redlands Coast provides important roosting and foraging habitat for all three species of flying-foxes that occur in South East Queensland (SEQ): the GHFF, BFF and LRFF.

2.1 Movements and known roosts

All flying-foxes are nocturnal, congregating during the day in communal roosts to rest, shelter from weather, socialise and rear their young. The number of flying-foxes in an area is tightly linked to flowering and fruiting of native foraging trees (Eby 1991), and roosts are generally seasonal. The microclimate within a roost and its proximity to water are significant factors in roost selection. On the Redlands Coast, most roosts are in melaleuca wetlands.

Roosts are like backpacker hostels, often full but with many different individuals. Sometimes there may be only a few individuals, up to hundreds of thousands, with individual animals frequently moving between roosts. Numbers can fluctuate significantly on a daily (up to 17% daily colony turnover; Welbergen et al. 2020) and seasonal basis. Flying-foxes are amongst the most mobile species in the world moving across their range between a network of national roosts. Flying-foxes are not specific to a local government area, but are part of a national population. One study showed 200 tracked individuals roosted in over 100 LGA's over five years with the average distance travelled by individuals being more than 2000 km per year (Welbergen et al. 2020). The implications are that local management actions can be ineffective or affect management in other jurisdictions (Welbergen et al. 2020).

Grey headed flying-fox and Black flying-fox can usually be found on the Redlands Coast throughout the year, BFF the more permanent of the two species. During the winter months large numbers of GHFF are drawn to the area by prolific flowering events on Moreton Island, North Stradbroke Island (Minjerribah) and the Southern Moreton Bay Islands (SMBI). As detailed in the GHFF Recovery Plan (DAWE 2021), this winter foraging habitat is critical to the survival of this threatened species. The GHFF has shown a preference to roost within 25 km of flowering events (Roberts 2012) and is generally in low numbers on the Redlands Coast when native flowering is low.

The Little red flying-fox is a specialist nectar feeder and the most nomadic species, an adaptation that allows them to follow unpredictable flowering of eucalypts and other native plants. LRFF will travel out to western Queensland into the Northern Territory then to Western Australia, the rainforests of Cape York then down the east coast of Australia as far as southern Victoria. LRFF usually arrive in their thousands on the Redlands Coast in January and move on in March/April, as they follow the flowering of eucalypts down the east coast.

There are 32 known roosts sites on the Redlands Coast (Figure 1), although many were used for very short periods and others have not been occupied for many years. Only a few are continuously used. Historical roosts may re-establish in the future, and new roosts are likely to form. These roosts form part of a network of roosts across the country, with each species considered to have a single national range.

Flying-foxes were captured for a tracking project (Roberts et al. 2012) from five SEQ locations including Dunwich, which provided valuable insights into flying-fox movements.

Data substantiated flying-fox movement between Sydney and Redlands Coast through rescue activities for flying-foxes tagged in the Sydney Royal Botanic Gardens dispersal.

A recent Queensland Herbarium-CSIRO study funded by the Queensland Government incorporated data from a range of sources to rank LRFF diet trees in bioregions across Queensland (Eyre et al. 2020). This was done using the method developed by Eby and Law (2008) by assessing the relative importance of LRFF diet tree species, the abundance of nectar produced during peak flowering periods, and the frequency of substantial flowering by a species, to obtain an overall Diet Plant Nectar score. There is significant overlap in the diet of all three species so these data provide indicative foraging habitat values for all species. Figure 3 shows the distribution of overall high value foraging habitat on the Redlands Coast.

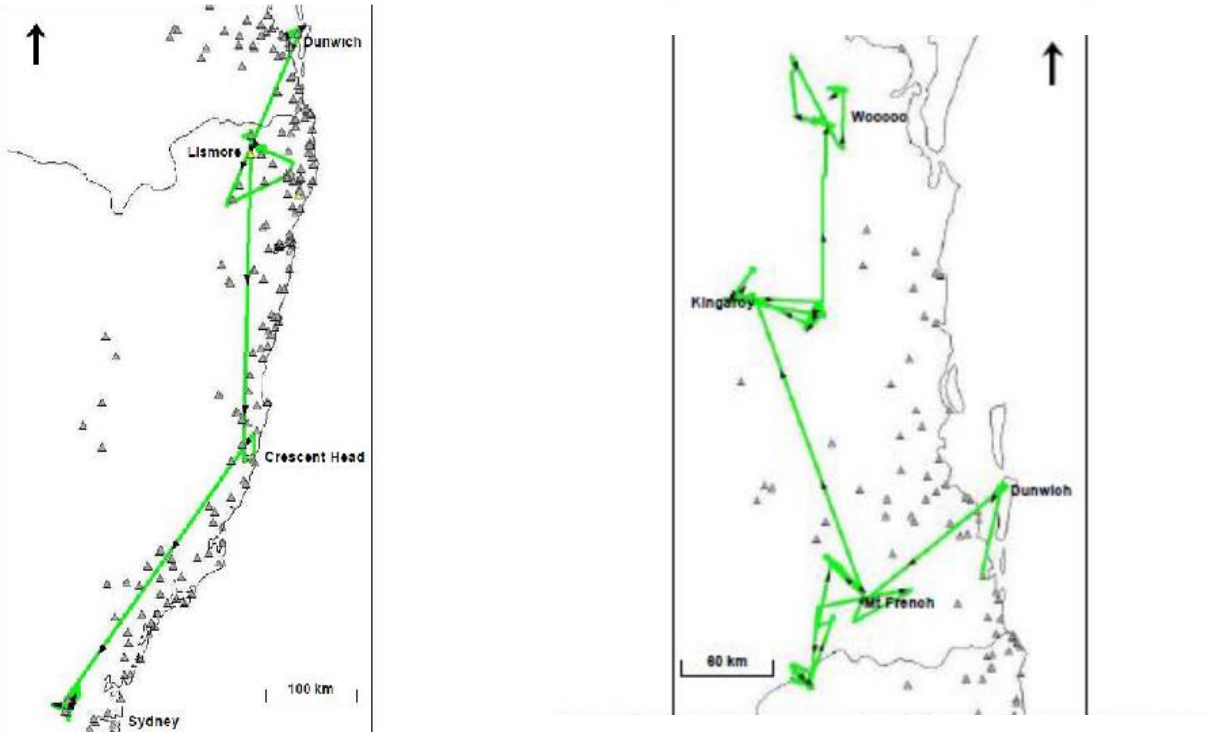


Figure 2 Tracking data showing long-distance movements of two flying-foxes captured in Dunwich (Source: Roberts et al. 2012). On the left showing an individual's movements over approximately seven months, and on the right another individual's movements over six months.

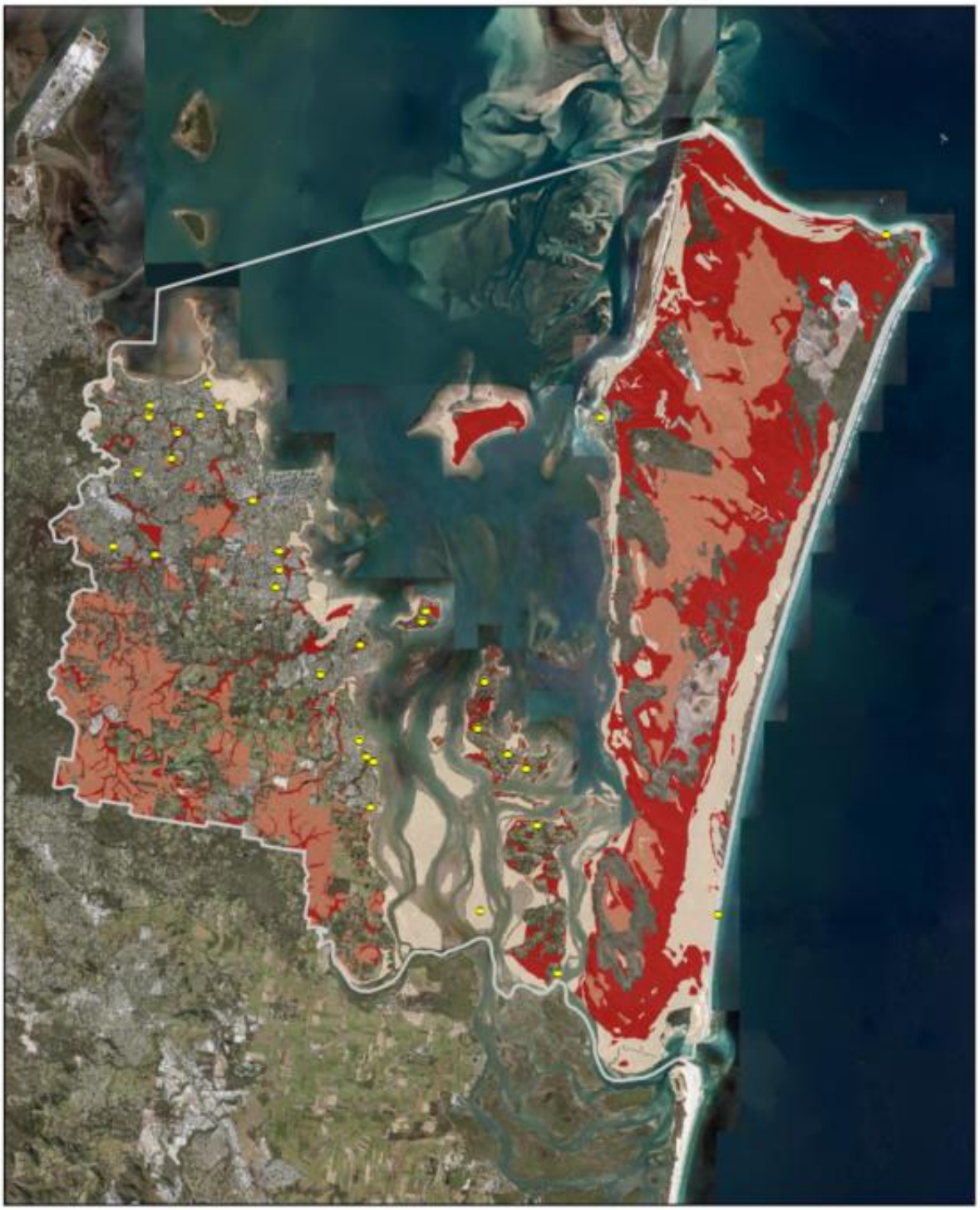


Figure 3: Distribution of the overall static nectar scores for remnant (2015) vegetation in Redland LGA

Data courtesy of Qld Herbarium/DES/CSIRO
Redland City Council
Flying-fox Management Plan

2.2 Under threat

Perceptions of increasing populations are often driven by dramatic, temporary increases in numbers. These changes in local abundance occur in all Australian flying-fox species and are driven by increases in the availability of foraging resources in the local area. Flying-foxes are able to fly hundreds of kilometres in a night and will follow resources across the landscape, moving to new roosts on a regular basis.

There is a wide range of ongoing threats to Australian flying-foxes, summarised in the National Recovery Plans for the GHFF (DAWE 2021). These include:

- clearing and degradation of native vegetation, removing appropriate roosting, breeding and feeding sites
- conflict with humans (including culling at orchards)
- infrastructure-related mortality (e.g. entanglement in barbed wire fencing and fruit netting, power line electrocution)
- exposure to other extreme weather events.

Extreme weather events are becoming more intense and more frequent. For example, heat stress events causing significant mass mortalities have been increasingly common in recent years and are at least in part attributable to climate change (Kim & Stephen 2018).

Flying-foxes are extremely vulnerable to temperatures above 38°C and have suffered widespread mass mortality when temperatures reach 42°C and above (Welbergen et al. 2007; Stanvic et al. 2013; Bishop and Lyons 2018). The largest heat stress mass mortality of flying-foxes occurred on a single day of extreme heat in South East Queensland in January 2014. This event killed approximately 46,000 flying-foxes across 52 roosts; about *half* of the BFF population in the affected area (Welbergen 2015, Kim and Stephen 2018). Redlands Coast temperatures are generally cooler than areas away from the coast, and as heat events become more common under climate change the Redlands Coast will likely become more important for refuge.

Between 2019 and 2020, flying-foxes experienced significant population impacts across the east coast of Australia due to extreme weather events. Broad-scale food shortages have caused mass mortality in 2019 and 2020, in which thousands of flying-foxes perished from starvation (Cox 2019; Huntsdale and Millington 2019). Following this, bushfires across the country resulted in the loss of large areas of native forest that provides natural foraging habitat for flying-fox populations. The total number of flying-foxes lost in these events is impossible to quantify but is likely to have been more than 100,000 individuals (M. Mo pers. comm. 2019).

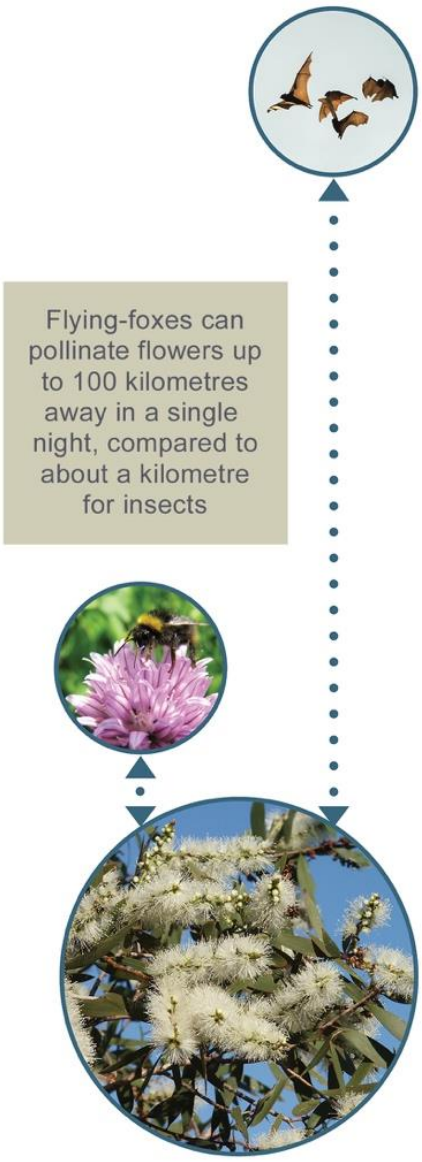
With these types of events severely impacting natural areas, foraging and roosting resources in and around urban locations become even more important for flying-fox conservation.

2.3 Ecological and economic importance

Flying-foxes, along with some birds, make a unique contribution to ecosystem health through their ability to move seeds and pollen over long distances (Southerton et al. 2004). This contributes directly to the reproduction, regeneration, and viability of forest ecosystems (DAWE 2020). It is estimated that a single flying-fox can disperse up to 60,000 seeds in one night (DELWP 2015). Some plants, particularly *Corymbia* species, have adaptations suggesting they rely more heavily on nocturnal visitors such as bats for pollination than daytime pollinators, for example producing more nectar at night (Southerton et al. 2004).

Flying-foxes may travel 200 km in a single night (Roberts et al. 2012). In comparison, bees, another important pollinator, move much shorter foraging distances of generally less than one kilometre (Zurbuchen et al. 2010).

Long-distance seed dispersal and pollination make flying-foxes critical to the long-term persistence of many plant communities (Westcott et al. 2008; McConkey et al. 2012), including eucalypt forests, rainforests, woodlands and wetlands (Roberts et al. 2006). Seeds that are able to germinate away from their parent plant have a greater chance of growing into a mature plant (DES 2018). Long-distance dispersal also allows genetic material to be spread between forest patches that would normally be geographically isolated (Parry-Jones and Augee 1992; Eby 1991; Roberts 2006). This genetic diversity allows species to adapt to environmental change and respond to disease pathogens. Transfer of genetic material between forest patches is particularly important in the context of contemporary fragmented landscapes and to allow ecosystems to adapt to climate change.



Flying-foxes are considered ‘keystone’ species given their contribution to the health, longevity and diversity among and between vegetation communities. These ecological services ultimately protect the long-term health and biodiversity of Australia’s bushland and wetlands. In turn, native forests act as carbon sinks (Roxburgh et al. 2006), provide habitat for other animals and plants, stabilise river systems and catchments, add value to the production of hardwood timber, honey and fruit (Fujita 1991), and provide recreational and tourism opportunities worth millions of dollars each year (DES 2018).

2.4 Life cycle

Flying-foxes reach reproductive maturity in their second or third year of life, and while individuals have been recorded to live to 18 years in the wild (Tidemann and Nelson 2011), the average life expectancy is between 5-7 years (Divljan et al. 2006; Fox et al. 2008).

Flying-foxes have just a single pup each year after a long gestation period that are dependent on their mothers for an extended period. These traits mean that flying-fox population growth is slow (Westcott et al. 2018) and they are very susceptible to threats (McIlwee and Martin 2002).

Pups are highly dependent on their mother for food and thermoregulation and are carried by the mother until approximately four weeks of age (Markus and Blackshaw 2002) or longer. When they are too heavy to carry, they are left at the roost during the night in a crèche until they learn to fly and begin foraging with their mother around January and February (Churchill 2008).

The general breeding season and life cycle are shown in Figure 4. While birthing is generally seasonal, it commonly occurs out-of-season and these timings are indicative only.

BFF and GHFF commonly birth and rear on the Redlands Coast, whereas LRFF only very rarely have young in SEQ, preferring to rear in tropical north Australia.

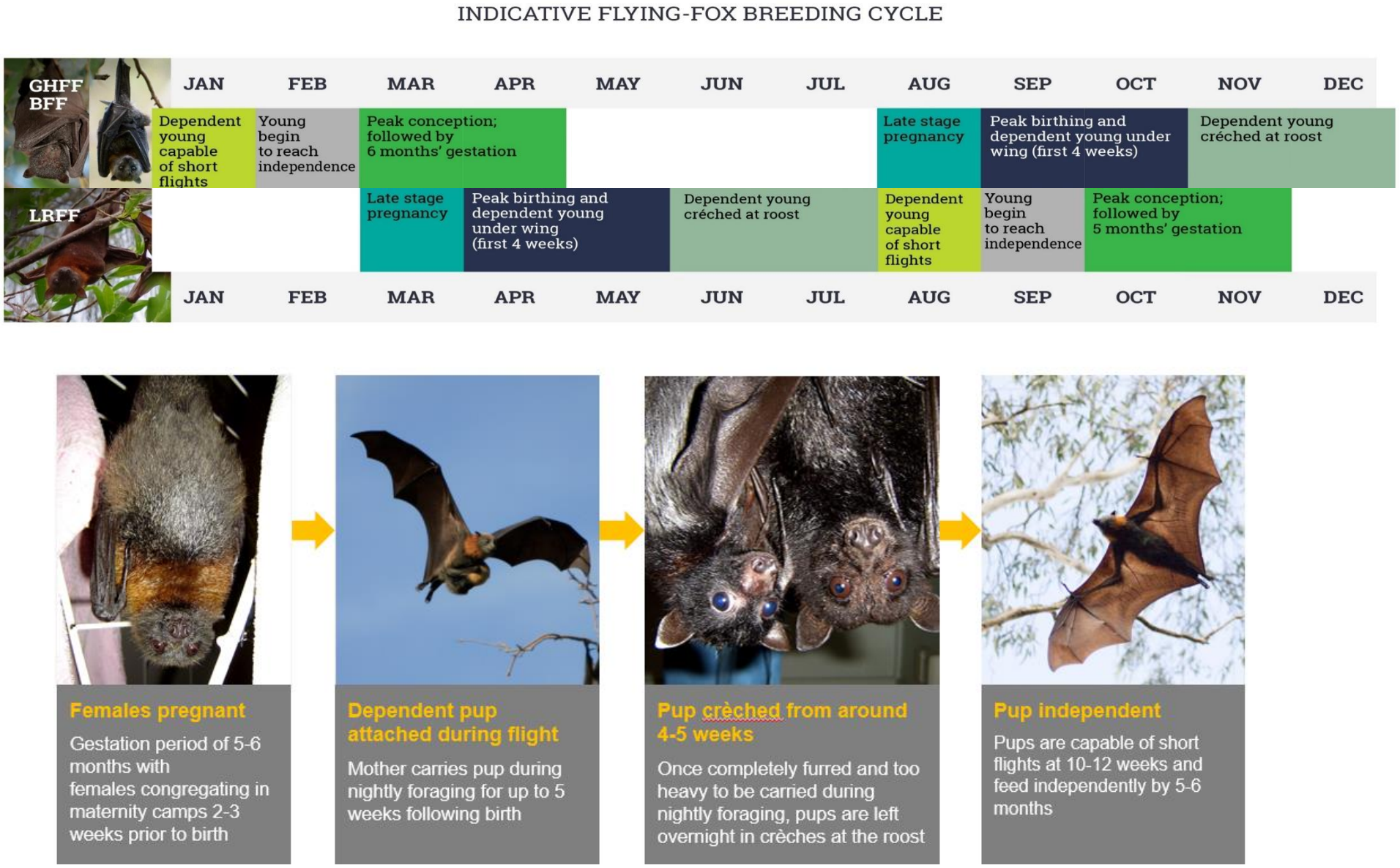


Figure 4 Indicative flying-fox breeding cycle and life stages

2.5 Living with flying-foxes

Whilst critically important to the environment, living with flying-foxes can be challenging for some people.

This Plan aims to provide a framework for Council to assist reducing impacts on members of the community.

Noise, odour, mess and other aspects of living near a flying-fox roost can contribute to anxiety, sleep deprivation, and impact people's mental health and wellbeing. This secondary impact is difficult to quantify and will vary with people's situations and tolerance levels.

There is a noticeable increase in complaints during seasonal increases in flying-fox numbers and when there are influxes of LRFF.

Noise

Noise is often reported by residents living near roosts to be one of the most significant impacts associated with flying-fox roosts. A highly sociable and vocal animal, the activity heard from a roost includes courting, parenting and establishing social hierarchy. Flying-foxes are generally quiet during the day but can become vocal when leaving and returning to a roost, or when disturbed. During the months of March and April noise levels are higher as this is mating season. During this time both sexes will return frequently to the roost at night and are vocal when competing for breeding partners and fighting over territorial spaces.

Odour

People often mistakenly believe that odour at a flying-fox roost or around some food trees is from their droppings. In fact, the musky smell is from pheromones which they use to communicate with each other. Odour may be more intense during the breeding and rearing season as female flying-foxes use scent to find their pups after foraging, and males regularly mark their territories (Wagner 2008). Likewise, odour is stronger after rain as males remark branches in their territories.

Other factors that will affect odour detectability and intensity, include the number of flying-foxes at a roost, weather conditions, wind direction, and site characteristics. Australian white ibis (*Threskiornis molucca*) commonly roost and nest in flying-fox roosts, and odour from nesting birds may be mistakenly attributed to flying-foxes.

Mess

Mess can reduce amenity, create a slip hazard, requires time and resources to clean, and can damage paint if not promptly removed. It is interesting to note though that the composition of bird droppings is actually more corrosive than flying-fox droppings, and neither should be left to 'bake' in the sun. Flying-foxes have an extremely fast digestive systems so most mess is in areas where they are feeding, and the majority of complaints received in the past have been associated with foraging flying-foxes. Foraging attractants can be managed (replaced, pruned

before fruiting/flowering, bagging fruit, wildlife friendly netting), and areas of concern covered, to assist mitigating this impact.

PPE and hygiene measures are required when cleaning any animal excrement (see link: Work with bird and bat droppings). Droppings should not be allowed to dry and bake on in the sun before cleaning. Wet newspaper left to soak on droppings can help cleaning, as can high-pressure hoses and specific cleaning products available.

Human and animal health

Flying-foxes, like all animals, may carry things that can be harmful to people or other animals. These risks can all be effectively mitigated through education, protocols, PPE and basic hygiene measures. Further information on flying-foxes and human/animal health is provided in Appendix 4.

More tips and answer to frequently asked questions can be found on Council's page at the link Living near flying-foxes (or via www.redland.qld.gov.au).

2.6 Previous management actions

Council has an adopted SoMI in line with the legislative framework (Appendix 3). This outlines Council's intentions and considerations with regards to the management of flying-fox roost sites.

Council has a strong history of managing flying-foxes through education and community engagement to foster awareness and understanding. Central to this is a comprehensive understanding of flying-fox movement, behaviour and seasonal influxes.

Council Wildlife Officers have worked closely with DES, researchers, other councils and the Redlands community for many years. Council has set an example in the proactive management of flying-fox issues through education, communication and raising awareness. Officers have provided a broad range of flying-fox education through:

- one-on-one engagement with the community
- general education to the community
    - distribution of information flyers to specific residential areas with seasonal influxes of flying-foxes and social media posts of seasonal, behavioral and extreme events
    - presentations to community groups and at events
    - activities such as regular displays at the Redlands IndigiScapes Centre, annual Halloween with the Bats at the Black Swamp school holiday activities to promote flying-foxes and their conservation
- provision of advice and education across Council
- onsite management and advice for operational works

- monthly monitoring of roosts to provide current population demographics and an opportunity to engage with residents

Council actively contributes and participates in the Flying-fox Management Working Group which provides an avenue for information sharing and discussion between local governments in Queensland and New South Wales. An off-shoot of this group is the SEQ Flying-fox Management Group which meets quarterly.

Council have regularly contributed to other relevant forums and programs to share information and ensure Council approach is up-to-date and effective. Council's approach has been recognised by DES and presented as an example of best practice management through education in the Flying-fox Management Guidelines.

Council has supported environmental groups in projects through a biannual grants program. The local flying-fox rescue group, Bat Conservation & Rescue Queensland Inc, (BCRQ) and other wildlife care groups have been successful in accessing funding.

2.6.1 Monitoring

Council wildlife officers undertaken monthly assessments of roosts on the Redlands Coast to record presence/absence, species, breeding activity and seasonal influences. Roost occupation by other species, disturbance and changes to vegetation is noted.

Regular monitoring has enabled Council to provide immediate response to the community when issues or conflicts arise. It provides Council officers with an opportunity to engage one-on-one with residents when undertaking monitoring at a roost site.

Due to the distance and timing constraints, officers concentrate on regular monitoring of all roosts on the mainland. Monitoring roosts on the islands is generally reported by phone, e-mail and/or photos from Council staff, community and DES volunteers when they are available. Roosts that are deemed high conflict or are subject to community complaints are monitored more regularly.

Council have been involved in a number of flying-fox monitoring programs from an annual national Grey-headed Flying-fox monitoring program to monthly and now quarterly monitoring undertaken by DES and CSIRO. These programs involve department staff, volunteers and recently, some LGA officers.

Currently, the DES officers are undertaking quarterly monitoring in conjunction with the CSIRO National Flying-fox Monitoring Program. Wildlife officers aim to coincide monitoring dates, when feasible, and share resources and data. In roosts which are high conflict and have been subject to formal complaints, DES officers will include them in their monitoring sites as the complaints often flow through to the department or minister. This collaboration has the added benefit of removing any perceived bias and reinforcing roost estimates and flying-fox messages.

2.6.2 Education and awareness

All flying-fox enquiries are dealt with on a case-by-case basis. Officers provide education and awareness with the residents on how to live with flying-foxes and to ensure public safety. Most resident complaints occur when flying-foxes are new to a site or there has been a sudden influx. Residents are usually reassured when they find out about the mobile nature of flying-foxes and the seasonal nature of their movements.

Council has a strong history of flying-fox education activities including community and school talks, annual education and awareness event and regular school holidays activities to educate the community about flying-foxes

2.6.3 Redlands 24 hr Wildlife Rescue Service

Council operates a 24 hr Wildlife Rescue Service that people can call if they find sick, injured or orphaned animals.

This service ensures that when residents come across injured or orphaned animals. Flying-fox calls are directed to the local specialised community group Bat Conservation and Rescue Qld Inc (BCRQ). The members of the Bat Conservation and Rescue Qld Inc are vaccinated and appropriately trained in the rescue of flying-foxes. This is another avenue for education and to provide the correct facts and dispel any misinformation often presented to the community via the media.

2.6.4 In-situ management

Council has created buffers for residents living in close proximity to flying-fox roosts at some locations. This is preferentially through weed removal or minor trimming of native vegetation, avoiding removal of native vegetation.

3 Community engagement

A Community Engagement Plan (CEP) was developed to guide engagement during preparation of the Plan to:

i. better understand community values, attitudes and opinions about flying-foxes, the flying-fox impacts they experience, and their expectations about how Council manages impacts

ii. use community and stakeholder feedback to develop an effective Plan, decision-making framework, Redlands Coast specific impact reduction and conservation strategies based on best practice, evidence, legislation and Council policy, and targeted community education campaigns.

Community engagement during development of the Plan has been through an online survey and public exhibition period, building on many years of collecting information from the community (Section 2.7). Further consultation with impacted communities will be undertaken during Plan implementation.

Community feedback has been considered in developing the management framework (Section 5) and action plan (Section 7), and concerns have been addressed where possible.

3.1 Online survey

The online survey was open from the 21st February to the 13th March 2022. The survey was advertised via:

- media release
- radio interview
- Council's web page
- Council's social media pages
- posters at libraries, service centres, signage at roosts, and dog off leash areas, with a QR code linking to the survey (Appendix 5).

Participation was incentivised with a random draw for 5x $100 gift vouchers.

Survey response data (response suburbs and demographics) was monitored weekly; social media advertising was boosted in suburbs with low response rates and signage at roosts was moved regularly to encourage response from potentially impacted communities.

Key survey results are below. For ease of interpretation, generally only the majority response is included below with strongly agree and agree grouped, and strongly disagree and disagree grouped. Expanded results are detailed and graphed in Appendix 6. Note respondents could often choose more than one option, so totals may exceed 100%:

- 281 respondents; 75% Redlands Coast residents, 6% Redlands Coast business owners, remainder visitors
- 52% reported living or owning a business near a flying-fox roost
- 59% have had positive experiences with flying-foxes on the Redlands Coast (22% negative, 18% neutral, 1% no response)
- 80% agreed flying-foxes are important for the environment and should be protected
- 78% agreed flying-foxes and humans should share the urban environment
- 64% disagreed flying-foxes are a nuisance and should be managed
- 64% like it when flying-foxes visit their garden
- 67% believe Council should not disturb flying-foxes
- 69% believe Council should balance conservation and resident amenity
- 95% believe Council should protect vegetation and other environmental values in parklands and bushland areas.
- The top four concerns for respondents within 100 m of a roost were:
  - smell and flying-fox welfare (70%)
  - mess from droppings (67.5%)
  - misinformation about flying-foxes (62.5%).
- Concerns such as smell, mess from droppings, noise, fear of disease, damage to vegetation and visual amenity were mentioned most often by respondents less than 100 m from a roost. These concerns generally decreased in the percentage of responses as distance from a roost increased.
- Where people reported being impacted, 89% were at home.
- Topics of interest/concern:
  - misinformation about flying-foxes (64%)
  - flying-fox habitat protection (63.3%)
  - flying-fox conservation (61.5%)
  - flying-fox welfare (59%)
  - mess from droppings (38%),
  - smell (27.4%),
  - fear of disease (27%),
  - noise (26%),
  - feeding in my yard (17%),
  - damage to vegetation (16%),
  - fruit loss at orchards (10%)
  - visual amenity (5%).
- Of respondents who live or own a business near a flying-fox roost, 43% were not in favour of subsidies, 35% felt subsidies would assist and 21% were unsure.

- Respondents living between 100 m and 300 m from a roost were most receptive to the idea of subsidies
- In order of most to least popular impact mitigation measures listed:
  - wildlife friendly netting and periodic cleaning (both 54%)
  - car covers (53%)
  - double glazing windows, clothesline covers (both 41%)
  - pool covers (34%)
  - loan of pressure cleaners from Council (32%)
  - subsidised outdoor cleaning (29%)
  - indoor air deodoriser (17%)
  - backyard tree replacement (11%).

4 Management options

Council is committed to an evidence-based approach to management. Table 2 provides an overview of methods used by other local governments to manage impacts associated with flying-foxes, and supported by research on management effectiveness (e.g. Currey et al. 2018), which provide for flying-fox conservation. Note approvals/authority will be required under legislation for some actions (see Appendix 1).

Table 2 Overview of management options suitable for use on the Redlands Coast

Management option	Brief description
Education and awareness programs	This option involves comprehensive and targeted flying-fox education and awareness program to provide accurate information to the local community about flying-foxes including information about managing impacts and alleviating concern about health and safety issues associated with flying-foxes, options available to reduce impacts from roosting and foraging flying-foxes, and information about flying-fox numbers and flying-fox behaviour at the roost. Council has a history of managing flying-foxes through education and community engagement to foster awareness and understanding, with the approach being recognised in the Queensland Department of Environment and Science Best Practice Guidelines.
Property modification	Property-level impact mitigation is one of the most effective ways to reduce amenity impacts to residents living adjacent to a flying-fox roost. Examples of property modifications include vehicle covers, carports, clothesline covers, clothes dryers, pool/spa covers, shade cloths, rainwater first-flush diverters, high-pressure water cleaners, air conditioners, fragrance dispensers or deodorisers, double-glazing of windows, door seals, screen planting, tree netting, and lighting (to discourage flying-foxes). Opportunities for funding assistance (e.g. subsidy programs – see below) may be available for management activities that reduce the need to actively manage a roost.
Subsidy program - property modification / item	Fully funding or providing subsidies to property owners for property modifications can be used to manage the impacts of the flying-foxes. Examples of property modification subsidies are listed above. Providing subsidies to install infrastructure may improve the value of the property, which may offset concerns regarding perceived or actual property value or rental return losses. Focusing funds towards manipulating the existing built environment reduces the need for modification and removal of vegetation.
Subsidy program - services	This management option involves providing property owners with a subsidy to help manage impacts on the property and lifestyle of residents. The types of services that could be subsidised include cleaning outside areas and property, solar panel cleaning, car washing or removing exotic trees and replacing with more appropriate species. Service subsidies may encourage tolerance of living near a roost, promote conservation of flying-foxes, can be undertaken quickly, will not impact on the roost site, and would reduce the need for property modification.
Routine roost maintenance and operational activities	All persons are authorised to undertake low impact activities at roosts in accordance with the Code of practice - Low impact activities affecting flying-fox roosts (DES 2020a; Appendix 1). Protocols should be developed for carrying out operations that may disturb flying-foxes, which can result in excess roost noise and risk flying-fox pup mortality. Such protocols may include limiting the use of disturbing activities to certain seasons or times of the day (see Council protocol Appendix 7).
Alternative habitat	This management option involves revegetating and managing land to create alternative flying-fox roosting habitat through improving and extending existing

Management option	Brief description
creation	low-conflict roosts or developing new roosting habitat in areas away from human settlement. Potential habitat mapping using roost preferences and suitable land tenure can assist in initial alternative site selection. A feasibility study would then be required prior to site designation to assess likelihood of success and determine the warranted level of resource allocated to habitat improvement.
Provision of artificial roosting habitat	Artificial structures can be constructed to augment roosting habitat in current roost sites or to provide new roosting habitat. Trials using suspended ropes have had limited success as flying-foxes only used the structures that were very close to the available natural roosting habitat. It is thought that the structure of the vegetation below and around the ropes is important.
Protocols to avoid incidents	This management option involves implementing protocols for managing incidents or situations specific to particular roosts. Such protocols may include monitoring at sites within the vicinity of aged care or child care facilities, management of compatible uses such as dog walking or sites susceptible to heat stress incidents (when the roost is subjected to extremely high temperatures leading to flying-foxes changing their behaviour and/or dying).
Research	Participating in research is important to improve knowledge of flying-fox ecology to address the large gaps in our knowledge about flying-fox habits and behaviours and why they choose certain sites for roosting. Research should aim to investigate the efficacy of new, innovative management technique, such as odour-neutralising technology. Further research and knowledge sharing at local, regional, and national levels will enhance our understanding and management of flying-fox roosts.
Appropriate land-use planning	Land-use planning should be used to ensure adequate distances are maintained between future residential developments and existing or historical flying-fox roosts. While this management option will not assist in the resolution of existing conflict, it is critical to avoiding future conflict. Incorporating roost locations into the planning scheme and property documentation would also assist avoiding future conflict.
Property acquisition	Property acquisition may be considered if negative impacts cannot be sufficiently mitigated using other measures. This option will generally be cost prohibitive but may be considered.
Buffers through vegetation removal	Vegetation removal can be used to create a buffer between residential properties and roosting flying-foxes to reduce noise, smell, and visual impacts. Vegetation removal aims to alter the area of the buffer habitat sufficiently so that it is no longer suitable as a roost. The amount required to be removed varies between sites and roosts, ranging from some weed removal to removal of most of the canopy vegetation. Permits may be required for vegetation removal.
Buffers without vegetation removal	Permanent or semi-permanent deterrents can be used to make buffer areas unattractive to flying-foxes for roosting, without the need for vegetation removal. This is often an attractive option where vegetation has high ecological or amenity value. Buffer options include visual deterrents, noise emitters, smell deterrents, canopy-mounted sprinklers (CMS), and screening plants. CMS are the most commonly implemented and effective of these options.
Noise attenuation fencing	Noise attenuation can be installed adjacent to residential properties to reduce noise and potentially odour where the roost is close to residents. Although expensive to install, this option could negate the need for habitat modification, maintaining the ecological values of the site, and may be more cost-effective than ongoing management. Temporary noise attenuating fencing may be considered as a more cost effective option for roosts with temporary influxes.
Early intervention before a new roost is established	This management option involves monitoring potentially suitable areas and investigating community feedback for signs of flying-foxes beginning to roost (in the daylight hours) and then managing habitat (e.g. weed removal) or otherwise deterring a permanent roost from establishing.

4.1 Unsupported activities

Attempts to relocate flying-foxes are extremely costly, and often splinter a roost to multiple undesirable locations that are difficult to predict (Appendix 8). Flying-foxes will regularly attempt to recolonise their preferred roost site when resources are available so the outcomes of dispersal attempts are usually very short-term. For these reasons, Council does not support dispersal as a management option.

Past activities from other Councils/agencies have demonstrated that the only effective way to prevent flying-foxes returning to a roost is with ongoing dispersal, or extensive vegetation removal (Appendix 8). This is usually done by the removal of understorey vegetation, opening the canopy and/or removal of all suitable roost trees. The consequent changes in habitat will have major implications for other fauna that use these areas, especially koalas. The majority of roost sites on the Redlands Coast support koalas, which feed and move through these areas at night when the flying-foxes are away foraging.

4.2 Unlawful activities

4.2.1 Unauthorised disturbance and vegetation management

Council and private landowners/managers are not permitted to alter or remove roost vegetation other than minor trimming (<10% of an individual tree per year) under the Low Impact Code when flying-foxes are absent. Approval by State, and potentially Commonwealth, Government (see Appendix 1) is required to disturb flying-foxes in a roost. Significant fines apply for unauthorised disturbance.

4.2.2 Culling

Culling is addressed here as it is sometimes raised by the community; however, culling is illegal and inhumane. Significant fines and potential imprisonment apply. Culling has been shown to be ineffective with Flying-fox Destruction Boards formed in the early 1900s being disbanded as ineffective by the 1920s (Westcott 2013).

Figure 6 Redland Bay Flying-fox Shooting Deputation 1914. At the time, like dingoes, there was a flying-fox bounty. Shooting proved to be ineffective and shooting boards around Australia were disbanded soon after forming. Source: Redland City Council Library

5 Management decision framework

Below is a roost categorisation tool (Table 3) that provides a framework for determining the appropriate level of management at a flying-fox roost (Table 4). Council will adopt a hierarchical approach to management where possible, beginning with options that least impact on the roost environment. At each stage Council will assess outcomes against objectives of this plan before deciding whether to progress to further stages. This is in line with Queensland Guidelines (DES 2020a) and Council's SoMI (Appendix 3).

Council will provide information and advice to any community impacted by roosting flying-foxes, however will only actively manage roosts on Council land.

Table 3 Roost categorisation tool. Must meet at least two criteria in category row; if only one criteria is met the roost will be categorised as the row above. See Table 4 for actions potentially suitable for each roost category.

Tenure	Community	Buffers from dwellings	Sensitive receptors**	Businesses	Roost occupancy in recent years	Roost category
Council-owned / managed	<10 residences within 30 m*	2 m +	Sensitive receptors distanced away	No known sensitive businesses within 100 m	Mainly low numbers (<2,500) / low density for site	1. Council and up to Level 1 options suitable
	<10 residences within 30 m			Sensitive businesses known within 100 m	Mainly low numbers (<2,500) / continuous occupation / high density for site / data deficient	2. Council and up to Level 2 options suitable
	>10 residences within 30 m	< 2 m**	Sensitive receptors in close proximity	N/A	Regular large numbers (>2,500) / continuous occupation, high density for site	3. Council and up to Level 3 options suitable
	Any	Any	Any	Any	Historical (5+ years since occupied)	4. Historical (reassess if reoccupied)
Non-Council land	Any	Any	Any	Any	Any	5. Non-Council, Level 1 options and support landholders with provision of advice regarding Level 2 or 3 actions as suitable for the roost according to this categorisation tool
Council / non-Council	As per Category 2 or 3 above	Any	As per Category 2 or 3 above	As per Category 2 or 3 above	Confirmed new roost / pop-up in undesirable location	6. New roost / pop-up in undesirable location

*30 m was chosen as a standard lot length and therefore representative of directly adjacent,

**All residents will have the option of at least a 2 m buffer from roosting flying-foxes wherever the width of the site allows. Council will provide this for roosts on Council land on request, and will provide advice to support residents to achieve this for roosts on non-Council land.

Note 2,500 has been selected as the threshold for roost occupancy as this is one threshold used to identify a nationally important GHFF roost in the National Recovery Plan (DAWE 2021) and Referral Guideline (DoE 2015, see also Appendix 1).

Table 4 Actions suitable for each roost category. Not all actions will be appropriate at all roosts (e.g. buffers may not be possible at narrow roosts), but can be considered in assessing impacts, ecological values, site characteristics, and consulting with relevant stakeholders. Approval required for each management level is also included.

Management level	Management option	Roost category					
		1	2	3	4	5	6
Level 1 actions (approved by Wildlife Officer)	Education and awareness program	✓	✓	✓	✓	✓	✓
	Land use planning	✓	✓	✓	✓	✓	✓
	Habitat improvement	✓	✓*	✓*	✓	✓	✓
	Property modification	✓	✓	✓	✓	✓	✓
	Routine maintenance and operational activities	✓	✓	✓	✓	✓	✓
	Protocols and procedures	✓	✓	✓	✓	✓	✓
	Support research	✓	✓	✓	✓	✓	✓
	Level 1 subsidies[#]	✓	✓	✓	✓	✓	✓
Level 2 actions (approved by Service Manager)	Level 2 subsidies[#]		✓	✓			
	Buffers without vegetation removal beyond weed removal or tree trimming (e.g. canopy-sprinklers)		✓	✓			
	Noise attenuation fencing		✓	✓			
Level 3 actions (approved by Group Manager)	Level 3 subsidies[#]			✓			
	Buffers with vegetation removal beyond trimming if required and will not result in loss of ecological values			✓			
	Property acquisition			✓			
	Early intervention - deter roosting at new locations likely to create conflict						✓

*habitat improvement is appropriate at all roosts to ensure flying-foxes are protected during severe weather (e.g. heat stress events). Provision of roost habitat at roosts other than Category 1 should be focussed on low conflict areas of the roost.

[#]at the time of Plan development a subsidies program is being trialled, if adopted by Council as an ongoing management option, a transparent system of allocating funds based on roost category and community feedback will be developed.

5.1 Roost assessment process

Figure 7 outlines the general process Council will take to assess any new flying-fox roost. These guidelines will be applied to reassess any roost that re-establishes or if a roost significantly changes.

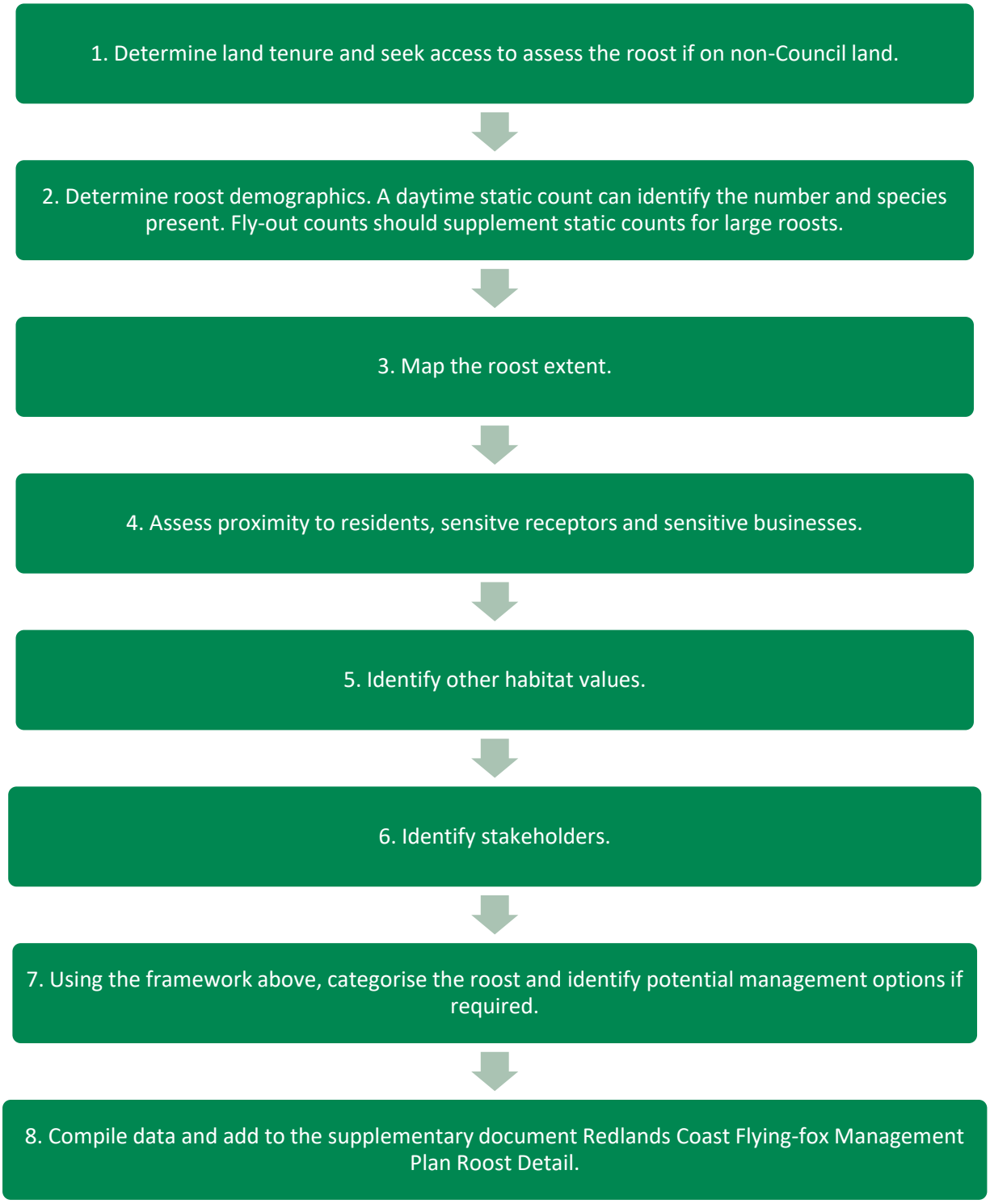


Figure 7 Assessment process for new roosts, or historical roosts that re-establish.

6 Assessment of known roosts

Table 5 provides an overview of known roosts on the Redlands Coast, categorised according to the framework detailed in Section 4. Further detail is provided in the supplementary document Redlands Coast Flying-fox Management Plan Roost Detail.

Table 5 Overview of known roosts on the Redlands Coast

Suburb	Roost name	Occupancy Category (see Appendix 9)	Roost category	Category rationale
Mainland roosts				
Birkdale	Collingwood Road	Continuous	2	Currently freehold but returning to Council management. >10 residents within 30 m, small buffers from residents, distanced from sensitive receptors, no sensitive businesses known within 100 m, low numbers of flying-foxes.
	Judy Holt Recreation Reserve	Historical	4	5+ years since occupied.
	Mary Street	Historical pop-up	6	5+ years since occupied, multiple sensitive receptors within 100 m, undesirable location for roost to establish.
Capalaba	Macquarie Street	Pop-up	6	Pop-up with low numbers, location undesirable for large roost.
	Redlands IndigiScapes Centre	Pop-up	1	<10 residents within 30 m, buffers from residences, distanced from sensitive receptors, no sensitive businesses known within 100 m (IndigiScapes being Council-owned and an environment centre provides good education opportunities), low numbers of flying-foxes. Management aim: conserve and encourage roosting.
Capalaba/Alexandra Hills	Valentine Park, Lawn Terrace	Previously Continuous, now Seasonal, nationally important GHFF roost	3	>10 residents within 30 m, buffers from residences, distanced from sensitive receptors, no sensitive business known within 100 m, regularly large numbers of flying-foxes.
Cleveland	Black Swamp Wetlands	Continuous, nationally important GHFF roost	3	>10 residents within 30 m, small buffers from residences, distanced from sensitive receptors, no sensitive business known within 100 m, regularly large numbers of flying-foxes.

Suburb	Roost name	Occupancy Category (see Appendix 9)	Roost category	Category rationale
	Kooringa Bushland Refuge	Seasonal (rare)	4	5+ years since occupied.
Redland Bay	Pitt Street	Seasonal	1	<10 residents within 30 m, buffers from residences, distanced from sensitive receptors, no sensitive businesses known within 100 m.
	Weinam Creek Wetland	Seasonal	3	>10 residents within 30 m, buffers from residences, distanced from sensitive receptors, potentially sensitive business within 100 m, mainly low numbers of flying-foxes in recent years.
	Orchard Beach Wetlands	Historical pop-up (one record)	1	>10 residents within 30 m, buffers from residences, distanced from sensitive receptors, no sensitive businesses known within 100 m, low numbers of flying-foxes very intermittently.
	Junee Street Wetlands	Continuous low numbers, (seasonally larger numbers)	3	>10 residents within 30 m, <2 m buffers from residences in some areas, distanced from sensitive receptors, no sensitive business known within 100 m, regularly large numbers of flying-foxes.
Thornlands	Clifford Perske Nature Refuge	Seasonal	2	>10 residents within 30 m, buffers from residents, distanced from sensitive receptors, mainly low numbers of flying-foxes.
	Lotus Close Wetland	Previously Continuous, now Seasonal	3	>10 residents within 30 m, buffers from residences, distanced from sensitive receptors, regularly large numbers of flying-foxes.
Victoria Point	Egret Colony Wetlands	Seasonal	2	>10 residents within 30 m, buffers from residents, distanced from sensitive receptors, mainly low numbers of flying-foxes in recent years (influxes of LRFF some years).
	Victoria Point High School	Seasonal	5	Non-Council land.
Wellington Point	Crossley Drive	Continuous	2	>10 residents within 30 m, buffers from residents, distanced from sensitive receptors, mainly low numbers of flying-foxes.
	Jacob Street	Pop-up	6	No confirmed records but location would likely lead to conflict.
	O'Connell Parade	Pop-up	1	<10 residents within 30 m, buffers from residences, distanced from sensitive receptors, no sensitive businesses known within 100 m.

Suburb	Roost name	Occupancy Category (see Appendix 9)	Roost category	Category rationale
	Tarradarrapin Wetlands	Previously Continuous, now Seasonal	1	<10 residents within 30 m, buffers from residences, distanced from sensitive receptors, no sensitive businesses known within 100 m.
Island roosts				
Coochiemudlo Island	George Street	Data deficient	5	Non-Council land.
	Tageruba Street	Historical (was Continuous-Seasonal)	5	Non-Council land.
Lamb Island	Lavender Street	Historical (was Seasonal)	4	5+ years since occupied.
	Long Island	Data deficient	5	Non-Council land.
Macleay Island	Balaka Street Urban Habitat	Historical pop-up	4	5+ years since occupied.
	Bay Islands Golf Club	Data deficient	2	<10 residents within 30 m, buffers from residences, distanced from sensitive receptors, sensitive businesses known within 100 m, unknown roost occupancy.
	Tim Shea's Wetland Reserve	Historical (was Seasonal)	4	5+ years since occupied.
	Wanda Street	Pop-up	4	5+ years since occupied.
North Stradbroke Island	Dunwich, East Coast Road	Seasonal	3	<10 residents within 30 m, buffers from residents, sensitive receptor nearby, potentially sensitive businesses within 100 m, regularly large numbers of flying-foxes.
	Point Lookout, Cylinder Beach	Continuous-Seasonal	3	>10 residents within 30 m, buffers from residents, distanced from sensitive receptors, low numbers of flying-foxes in recent years.
Russell Island	Cavendish Street	Historical (pop-up)	4	5+ years since occupied.
	Kingfisher Court	Historical (pop-up)	4	5+ years since occupied.

7 Action plan

The action plan to meet objectives in Section 1.1, with consideration of community feedback summarised in Section 3, is separated into:

- Management actions to address concerns of residents experiencing lifestyle impacts associated with living in close proximity to flying-fox roosts (Section 7.1)
- Education and engagement strategy (Section 7.2)
- Conservation strategy (Section 7.3).

These actions are in line with legislation (Appendix 1), Council's SoMI (Appendix 3) and roost assessment (Section 6) and will be evaluated during review process (Section 8).

7.1 Impact mitigation actions

Management actions according to roost category as per the framework in Section 4 are outlined in Table 6. All actions must be undertaken in accordance with relevant legislation (Appendix 1).

Table 6 Management actions. Category 1 roosts.

Roost	Action	Timeframe	Responsibility	Estimated budget
Applicable to all roosts	Monitor occupied mainland roosts on Council land monthly, mainland roosts on non-Council land quarterly with landholder permission, island roosts quarterly and historical roosts quarterly or in response to reports of roosting. Consult and train other Council teams to assist monitoring of some roosts to maximise resource efficiency (e.g. Council mosquito management team for island roosts).	Ongoing	EEU	BAU
	Continue to promptly investigate reports of flying-foxes roosting in new locations. Assess any previously unrecorded locations and proactively manage to encourage roosting in desirable locations (through habitat improvement and measures to avoid disturbance) or deter roosting in undesirable locations (through removing weeds to keep structure as open as possible).	Ongoing	EEU P&C	BAU
	Provide advice to impacted residents about property-level options to reduce impacts.	Ongoing	EEU	BAU
	Continue seeking grant funding for projects that can assist impacted community.	As required	EEU	BAU
	Trial a program of services (e.g. cleaning) / subsidised property options at a Level 3 roost and determine potential for regular budget allocation for any roost where flying-foxes are in close proximity to residents. If subsidies program to be continued, develop a transparent system to allocate funds based on community feedback in Section 3.	2022-23	EEU with EP input and in consultation with COG, PDG	Trial grant funded, variable budget allocation possible
	Continue allocating sufficient resource for dedicated staff to manage wildlife conservation and conflict issues including flying-foxes, including an additional part-time Officer.	Ongoing	EEU	Part-time Officer

Roost	Action	Timeframe	Responsibility	Estimated budget
	Continue to support research and new technology trials, particularly projects which will assist in understanding local flying-fox movements and ways to mitigate impacts on the community.	Ongoing		Assessed on a by-project basis
	Develop factsheet about flying-fox roosting and foraging preferences to inform planning considerations and other programs (e.g. offsets, conservation plantings, one million trees program).	2022 (prior to workshop below)	EEU	BAU
	Internal planning workshop with outcomes addressed where possible in the next City Plan review: · Identify roosts and potential habitat in Planning Scheme to incorporate suitable buffers in new developments, and to allow potential property owners to see roost locations · Investigate level of protection / buffers already in place e.g. conservation zones · Identify and implement suitable development controls e.g. dwelling setbacks, glazed windows, covered car areas, covered clotheslines, outdoor areas away from roost etc. · Consider property notes for new houses near roosts · Consider exemptions to some general development controls if required for impact mitigation structures near roosts (e.g. car covers, garages) · Encourage voluntary conservation agreements / covenants. See also planning considerations in Section 7.3.	2022	EEU with CPAG, SPU, DCU	BAU
	Ensure effective internal consultation when assessing development applications, and implementing programs that may create flying-fox habitat to avoid conflict, and support habitat improvement in low conflict areas (see also strategic linkages in Appendix 2).	Ongoing	CPA/SPU, DCU, Conservation, Bushcare, SPU to consult with EEU	BAU
	Restore and improve flying-fox roosts in low conflict locations, and enhance other low conflict areas to encourage roosting away from residents and avoid future conflict, working in partnership with Traditional Owners, community groups and inviting community participation.	Ongoing	PCSU, Bushcare, EP to consult with EEU and QYAC	$20,000 p.a plus grant funding where possible.
	Ensure Council and community plantings avoid roost/foraging species in high conflict areas (informed by fact sheet to be developed as per action	Ongoing	PCSU, Bushcare, EP in consultation	BAU

Roost	Action	Timeframe	Responsibility	Estimated budget
	above).		with EEU	
	Continue sensitive mowing procedures to avoid disturbance / planting buffers with low-growing species use of herbicide / to maintain clear areas next to properties.	Ongoing	COG in consultation with EEU	BAU
	Continue to ensure airfield managers are aware of roost locations and seasonal influxes/trends.	Ongoing	EEU	BAU
	Continue to consult with internal and external stakeholders (see Section 1.2) during implementation of the Plan.	Ongoing	EEU	BAU
	Continue education and engagement with the community, as per the education and engagement strategy in Section 6.2.	Ongoing	EEU	See Section 6.2
Category 1 roosts				
Capalaba, Redlands IndigiScapes Centre	Manage weeds, protect and improve habitat to encourage roosting.	Ongoing	PCSU in consultation with EEU	BAU
	Install signage if roost establishes and incorporate into education programs.	If roost establishes	EEU	$1,000
Redland Bay, Pitt Street	Maintain current buffers from residences. Repair fence.	Ongoing	PCSU in consultation with EEU	BAU
	If flying-fox numbers increase or the roost becomes more continuous, reassess category.	If required	EEU	BAU
	Engage with nearby residents to ensure correct information about flying-foxes and avoid future conflict.	Ongoing	EEU	BAU
Redland Bay, Orchard Beach	Maintain current buffers from residences.	Ongoing	PCSU in consultation with EEU	BAU

Roost	Action	Timeframe	Responsibility	Estimated budget
	Mating observed, engage with residents prior to mating season and install signage when required.	Ongoing	EEU	BAU
Birkdale Tarradarrapin Creek Wetlands	Install signage if roost becomes more continuous.	Ongoing	EEU	$1,000
	Cover playground or trim nearby vegetation and schedule regular cleaning when flying-foxes return.	As required	COG	$5,000 for cover or BAU for trimming and cleaning
	Consider additional planting to encourage flying-foxes back to roost.	ASAP	PCSU in consultation with EEU	BAU
	Engage with nearby primary school to educate students. Work with staff to develop protocol for monitoring school grounds.	Ongoing	EEU	BAU
Category 2 roosts				
Birkdale, Collingwood Road	Engage with nearby residents to ensure correct information about flying-foxes and avoid conflict.	Ongoing	EEU	BAU
	Wildlife Officers to complete roost assessment following consultation with residents.	2022	EEU	BAU
	Consider temporary footpath closure if required to minimise roost disturbance for residents and flying-fox welfare.	2022	EEU in consultation with COG/AMU	
	Maintain current buffers.	Ongoing	COG in consultation with EEU	BAU
	Ensure planning controls for new developments in the area.	Ongoing	CPAG	BAU
Macleay Island, Bay Islands Golf Club	Support site maintenance in line with lease agreement (e.g. weed control, maintain buffers).	Ongoing	COG in consultation with EEU	BAU
	Maintain buffers on Council land between residences through weed removal. Advise residents of tree management options on private property.	Ongoing	COG in consultation with EEU	BAU

Roost	Action	Timeframe	Responsibility	Estimated budget
	Ensure new developments have controls to protect the roost and avoid future conflict.	Ongoing	CPAG, DCU	BAU
Thornlands, Clifford Perske Nature Refuge	Letterbox drop and install temporary signage if temporary seasonal influxes occur. Eg: LRFF or mating roost. (LRFF).	Seasonally	EEU	BAU
	Maintain current buffers.	Ongoing	COG in consultation with EEU	BAU
Victoria Point, Egret Colony Wetlands	Letterbox drop and install temporary signage if temporary seasonal influxes occur. Eg: LRFF or mating roost.(LRFF).	Seasonally	EEU	BAU
	Maintain vegetation along Egret Drive to allow pedestrian access, or redirect foot traffic with signage.	Ongoing	COG in consultation with EEU	BAU
Wellington Point, Crossley Drive	Maintain current buffers. While native vegetation removal is generally not supported for Category 2 roosts, some acacias may need to be removed to maintain Whepstead Drive buffer of disconnected habitat.	Ongoing	COG in consultation with EEU	BAU
	Engage with nearby primary school to educate students. Work with staff to develop protocol for monitoring school grounds.	Ongoing	EEU	BAU
Category 3 roosts				
Capalaba/Alexandra Hills, Valentine Park, Lawn Terrace	Install temporary signage depending on roost location and seasonal variations in species/behaviour.	Seasonally	EEU	BAU
	Maintain current buffers.	Ongoing	COG in consultation with EEU	BAU
	Consider permanently diverting path to eastern side of drain / temporary closures when required to minimise roost disturbance for residents and flying-fox welfare.	2022-23	EEU and COG/AMU	$5,000 for permanent diversion or BAU for temporary
	Engage with disc golf operators to avoid disturbing roost to avoid impacting flying-foxes and increasing impacts on residents.	ASAP	EEU	BAU
	Selectively remove midstorey in a 10 m buffer as per the action plan for	2022-23	EEU and COG	If progressed ~$15,000 install

Roost	Action	Timeframe	Responsibility	Estimated budget
	the site and/or investigate CMS trial to increase buffers for impacted residents. Approximate locations where sprinklers may be installed if feasible is shown in the supplementary Roost Detail document. A trial would determine potential for ongoing use. Actions permitted under Roost Management COP with notification, mitigation standards in EPBC Act Referral Guideline must be followed or referral to Commonwealth required.			
Cleveland, Black Swamp Wetlands	Replace and maintain signage being considerate of aesthetics for residents (narrow/angled signage) and in consultation with Friends of Black Swamp.	2022	EEU	Included in current grant budget.
	Maintain viewing platform.	Ongoing	COG in consultation with EEU	BAU
	Engage with landholders if buffers <2 m to determine if trimming/weed removal required. Maintain break on western edge adjacent to dwellings (as appropriate to fire management).	ASAP	COG in consultation with EEU	$3,000 p.a.
	As a nationally important GHFF roost and locally significant site, engage with stakeholders (including Friends of Black Swamp) to prepare a detailed site management plan including flying-fox conservation, habitat preservation and water management. Habitat should be made most attractive to roosting towards the centre and northern areas of the site further from residents, and over time less attractive at edges.	ASAP	EEU in consultation with PCSU, RDMU and EngEU	$10,000
North Stradbroke Island, Dunwich, East Coast Road	Manage weeds to ensure roost is sustainable. Consultation with QYAC and Department of Transport and Main Roads required.	Ongoing	PCSU in consultation with EEU	BAU
	Engage with DTMR and QYAC on future management of roost areas. Engage with QYAC on opportunities for education.	Ongoing	EEU	BAU
	Investigate tourism opportunities with visitors.	2022-23	CETG in consultation with EEU	BAU
	Engage with nearby primary school to educate students. Work with staff to	Ongoing	EEU	BAU

Roost	Action	Timeframe	Responsibility	Estimated budget
	develop protocol for monitoring school grounds.			
	Restrict parking in key areas around the roost and ensure roost not impacted by parking proposal.	ASAP	COG in consultation with EEU	BAU
	Consider permanent signage.	2022-23	EEU	$1,000
North Stradbroke Island, Point Lookout, George Nothling and Home Beach	Investigate buffers from residences if flying-foxes return to George Nothling location where safe slope access possible.	If required	COG in consultation with EEU	BAU
	Engage with staff accessing services to ensure roost disturbance is avoided.	Ongoing	COG in consultation with EEU	BAU
Redland Bay - Junee Street Wetlands	Engage with landholders if buffers <2 m to determine if trimming/weed removal required.	ASAP	EEU	BAU
	Install temporary signage depending on roost location and seasonal variations in species/behaviour. Potential location for permanent signage at Junee Street Park.	2022-23	EEU	BAU ($1,000 if permanent signage installed)
Redland Bay - Weinam Creek Wetland	Ensure new developments are considerate of roosting flying-foxes with controls to protect the roost and avoid future conflict.	Ongoing	CPAG in consultation with EEU	BAU
	Engage with nearby business if flying-foxes return in large numbers to ensure up-to-date information for staff and guests.	As required	EEU	BAU
Thornlands - Lotus Close Wetland (Primrose Drive Wetlands)	Investigate option for CMS in key areas (approximate locations in supplementary Roost Detail document) ensuring nesting waterbirds are not impacted. Consultation with DES required to determine need for an SMP. Trial would determine potential for ongoing use.	2022-23	EEU	If progressed ~$15,000 install
	Conserve nesting waterbirds (Species Management Program for any activity that may disturb breeding place).	Ongoing	EEU	BAU
	Investigate options to improve water quality and health of environment.	2022-23	EEU, AMU, RDMU, PCSU	BAU

Roost	Action	Timeframe	Responsibility	Estimated budget
Category 4 roosts				
Birkdale, Judy Holt Recreation Reserve	Likely low conflict site could be considered for habitat improvement to encourage roosting.	2022-23	PCSU in consultation with EEU	BAU
Cleveland, Kooringa Bushland Refuge	If flying-foxes return, engage with landholders where buffers <2 m to determine if trimming/weed removal required.	If required	EEU	Firebreak maintenance - BAU
Lamb Island, Lavender Street; Macleay Island, Balaka Street Urban Habitat; Macleay Island; Tim Shea's Wetland Reserve; Macleay Island, Wanda Street; Redland Bay, Orchard Beach; Russell Island, Cavendish Street; Russell Island - Kingfisher Court	Reassess if flying-foxes return.	If required	EEU	BAU
Category 5 roosts				
Coochiemudlo Island - George Street; Coochiemudlo Island, Tageruba Street; Long Island	Support residents with advice if roosting is causing impacts.	If required	EEU	BAU
Victoria Point, Victoria Point High School	Engage with school to educate students. Work with staff to develop protocol for monitoring school grounds.	Ongoing	EEU	BAU
Category 6 roosts				

Roost	Action	Timeframe	Responsibility	Estimated budget
Birkdale, Mary Street; Capalaba, Macquarie Street; Wellington Point, Jacob Street	Manage weeds and keep structure as open as possible to deter a roost establishing.	ASAP	PCSU in consultation with EEU	BAU

7.2 Education and engagement strategy

Education and engagement are primary measures that will be adopted by Council to manage conflict with flying-fox roosts. Actions that form this strategy are outlined in Table 7.

A review and update of interpretative signage was identified as a priority action during development of the Plan.

Table 7 Education and awareness strategy.

Action	Timeframe	Responsibility	Estimated budget
Review and implement the Flying-fox Education Communications Plan to promote appreciation and tolerance of flying-foxes. Include in education messages the potential economic impacts if flying-fox populations declined.	Ongoing	EEU	BAU
Collaborate with Traditional Owners to deliver education and engagement.	Ongoing	EEU and CETG	
Keep community and internal stakeholders informed of flying-fox numbers, monitoring trials and upcoming management. Continue to update Council's mapping and share monitoring data and map access with the community. Investigate potential to create a layer that provides buffers around flying-fox extents and relevant triggers/actions to assist planning works and operations.	ASAP and ongoing	EEU	BAU
Provide opportunities for consultation where the community has expressed concern about a flying-fox roost.	As required	EEU	BAU
Allocate budget for annual Bat Nights and other educational events in collaboration with community groups (e.g. Bat Conservation and Rescue Queensland).	Annually	EEU	$10,000 p.a.

Action	Timeframe	Responsibility	Estimated budget
Install signage at suitable roosts.	As required	EEU	Costed above
Encourage and continue to contribute to positive media coverage.	Ongoing	EEU, CETG	BAU
Promote ecotourism opportunities. For example, since 1984 Batty Boat Cruises have been run regularly for tourists to watch flying-foxes leave their roosts from the Brisbane River; one of the top-rated attractions in Austin, Texas is to watch 1.5 million Mexican free-tail bats fly-out from their roost - the Radisson Hotel offers special bat packages from viewing bedrooms (Kerr and Thiret 2016).	At least annually	EEU, CETG	BAU
Encourage removal of non-native foraging trees that negatively impact on flying-foxes, the environment, and contribute to foraging impacts for the community (e.g. Cocos palms).	Ongoing	EEU, PCSU	BAU
Develop lists of local native plant species that residents can plant if they do or do not want to attract foraging flying-foxes, and a list of fragrant species that can assist odour masking near roosts, and appropriate plants to use in different areas to avoid conflict (e.g. avoiding favourable roost vegetation in urban areas and new developments, avoiding low-growing foraging plants near roads).	July 2022	EEU	BAU
Raise awareness about replacing or modifying infrastructure known to cause flying-fox mortality e.g. barbed wire, overhead powerlines including developing fact sheets.	Ongoing	EEU	BAU
Recommend horse owners adopt suitable measures to avoid HeV (e.g. vaccination, covering horse feed and water troughs, exclude horses from tree drip lines of foraging and roosting trees).	Ongoing	EEU	BAU
Develop and conduct training for staff/community involved in working around flying-foxes and customer relations staff responding to customer inquiries.	Ongoing	EEU	BAU
Support and encourage flying-fox research, and make information readily available to the community and other land managers.	Ongoing	EEU	BAU

7.3 Conservation strategy

Conservation of all flying-foxes on the Redlands Coast is a key objective of the Plan and will underpin management decisions.

Table 8 outlines broad strategies and actions considered important for flying-fox conservation. Actions are in line with the National Recovery Plan for the GHFF (DAWE 2021) and will support recovery of this nationally threatened species.

Modelling suitable roost habitat was identified as a priority conservation action, and an overview is provided in Section 7.3.1.

Table 8 Conservation strategy actions

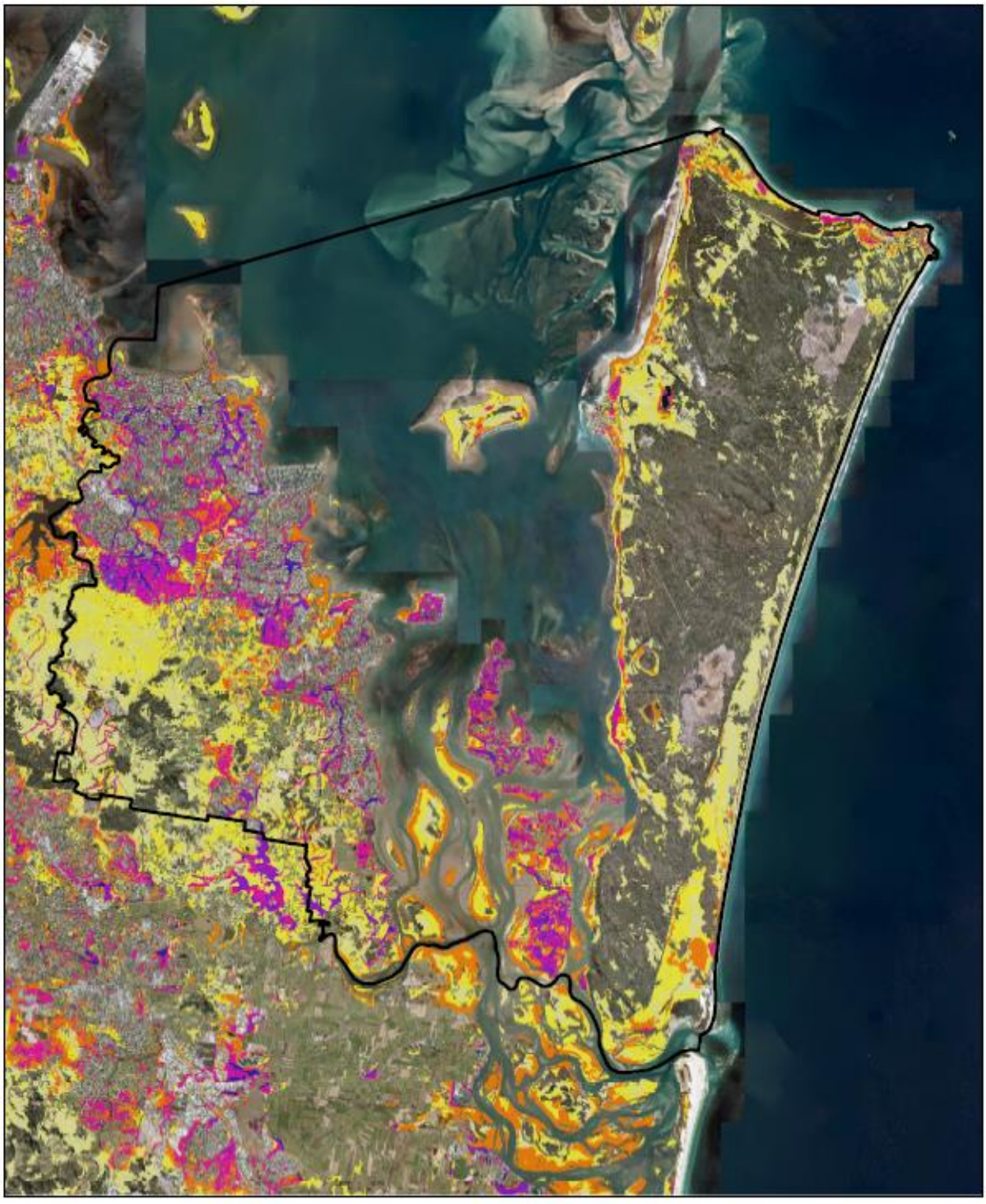
Strategy	Action	Timeframe	Responsibility	Estimated budget
Education	Implement the Education and Engagement Strategy (Section 7.2)	ASAP and ongoing	EEU	BAU
Monitoring	Ensure regular monitoring of all known flying-fox roosts and continue providing data to the National Flying-fox Monitoring Program (NFFMP).	Ongoing	EEU	BAU
	Ensure monitoring at appropriate temporal and spatial scales around any roost management.	Prior to, during and following roost management	EEU	BAU
	In collaboration with wildlife rescue and care organisations, monitor for potential heat stress events during predicted hot weather using the online heat stress forecaster http://www.animalecologylab.org to allow proactive management where possible. Enter data into national database at same link.	Every summer	EEU	BAU
	Continue monitoring for other potential impacts such as starvation events, paralysis, pup abandonment events and share information with stakeholders (e.g. BCRQ).	Ongoing	EEU	BAU
Habitat protection	Ground-truth and improve modelled habitat in Section 7.3.1.	Begin 2022-23	EEU	BAU
	Restore and improve suitable flying-fox habitat (known and potential) to increase net available habitat (roost and foraging), offset habitat loss (especially associated with roost management) and encourage flying-foxes to suitable locations.	Medium-term	PCSU in consultation with EEU	Variable
	Ensure all management and operations near roosts are sympathetic to flying-fox habitat requirements (including mid-storey for protection during extreme weather), and welfare requirements (e.g. appropriate mowing regimes during pup rearing season).	Ongoing	All units to consult with EEU	Variable

Strategy	Action	Timeframe	Responsibility	Estimated budget
	Consider habitat protection measures (e.g. appropriate zoning) for flying-fox roost and foraging habitat.	Short-term	CPAG in consultation with EEU	BAU
	Consider temporary/permanent exclusion measures if flying-foxes are being disturbed by public access (especially during birthing and rearing).	Ongoing	EEU in consultation with COG/AMU	BAU
	Identify sensitive fuel reduction strategies to protect roosts.	As required	PCSU in consultation with EEU	BAU
Disaster management	Ensure evidence-based best practice management during severe weather response (e.g. heat stress events).	Before summer 2023	EEU	BAU
	Support wildlife carers assisting flying-foxes where possible during extreme events.	Ongoing	EEU	BAU
Reduce urban mortality and other threats	Map hotspots for wildlife entanglements using rescue data.	2022-2023	EEU	$5,000
	Replace (where possible) or otherwise modify barbed wire fencing on all Council property to avoid wildlife entanglements.	Begin 2022-23	AMU, COG in consultation with EEU	$15,000
	Engage with landholders at hotspots to modify fencing/netting to reduce mortality.	Ongoing	EEU	BAU
	Work with power providers to space/bundle powerlines in electrocution hotspots.	Begin 2022-23	EEU	BAU
	Investigate options to incorporate more controls about use of barbed wire and large aperture netting into local law and development controls.	2022-23	CPAG	BAU
	Avoid planting low-growing foraging species (e.g. grevillea) in centre medians and road edges. Replace with tall foraging species (e.g. eucalypts) where appropriate (e.g. avoid areas with powerlines) or non-foraging species.	Ongoing	CPAG, COG, AMU, PDG, EEU	BAU
Support flying-fox rescue and carer	Continue to fund Redlands Wildlife Rescue.	Ongoing	EEU	BAU
	Advertise grants within relevant networks so that wildlife carers are aware grant funding may be available.	Ongoing	EEU	BAU
	Encourage two-way communication between Council and wildlife groups to share data and other information.	Ongoing	EEU	BAU
Suitable land use planning	Investigate further flying-fox roost protection measures in the Council planning process (e.g. covenants).	2022-23	CPAG in consultation with EEU	BAU
General	Integrate relevant actions from this Plan into other local and regional conservation strategies.	ASAP and ongoing	All units	BAU

7.3.1 Potentially suitable roost habitat

While it is acknowledged that flying-fox roost selection is difficult to predict and research to better understand how they select their roost sites is ongoing, known favoured characteristics were modelled to provide indicative suitable roost habitat on the Redlands Coast (Figure 8). Modelling methods are provided in Appendix 10.

Identifying potentially suitable habitat will provide for suitable land use planning, habitat allocation, restoration, improvement and protection. Potentially suitable roost habitat must be retained and created in suitable areas to avoid future conflict. Outputs of this model will be further queried and ground-truthed by Council Officers before being used to inform other programs. It must be noted that while this assessment was based on known roost preferences, it does not mean that flying-foxes will use these areas, or that roosts will not form in habitat not identified in the model.


Potential flying-fox habitat score
Redland City Council
Flying-fox Management Plan
Redland City Council LGA
Potential habitat score
21 - 23
23.1 - 26
26.1 - 29
29.1 - 32
32.1 - 36
36.1 - 41
ecosure
improving ecosystems
Job number: PR8777
Revision: 0
Author: EK
Date: 21/03/2022
GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

8 Plan administration

8.1 Plan review and evaluation

The Plan will be reviewed regularly including at least annual evaluation of actions in Section 7. The following may also trigger a review of the Plan:

- completion of a significant management action (including submission of a Flying-fox roost management evaluation form to DES)
- changes to legislation
- any incident associated with roosting or foraging flying-foxes
- new research that informs conflict mitigation or flying-fox conservation.

8.2 Monitoring

Council will monitor and keep internal records to allow the effectiveness of each management action to be evaluated and inform future planning.

8.3 Funding commitment

Implementation of the Plan requires substantial ongoing funds. Council has been the recipient of government funds to assist preparation of this Plan and initial implementation. Council will need to ascertain resources for implementing actions associated with the Plan on an annual basis.

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Appendix 1 Legislation

Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

The GHFF is listed as vulnerable under the EPBC Act making it a Matter of National Environmental Significance (MNES). The National Recovery Plan for the GHFF (DAWE 2021) sets out management and research actions necessary to stop the decline of, and support recovery of the GHFF.

A referral to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) is required under the EPBC Act for any action that is likely to significantly impact on the GHFF as a MNES, as detailed in the Referral guideline for management actions in GHFF and SFF roosts (DoE 2015) (the Referral Guideline).

A GHFF roost that meets the following criteria is defined as nationally important:

- contained ≥10,000 GHFF in more than one year in the last 10 years, or
- been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years.

State

Nature Conservation Act 1992

All flying-fox species and their roosts are protected in Queensland under the NC Act. The Threatened Species Program 2020-2040 (DES 2020) also applies to the GHFF.

In 2007 an amendment was made to the NC Act with regards to Restrictions relating to flying-foxes and flying-fox roosts – section 88C. This new section required anyone wishing to undertake an activity with potential to disturb or destroy a roost to apply to the Queensland government by submitting a Species Management Program (SMP) or applying for a Damage Mitigation Permit (DMP).

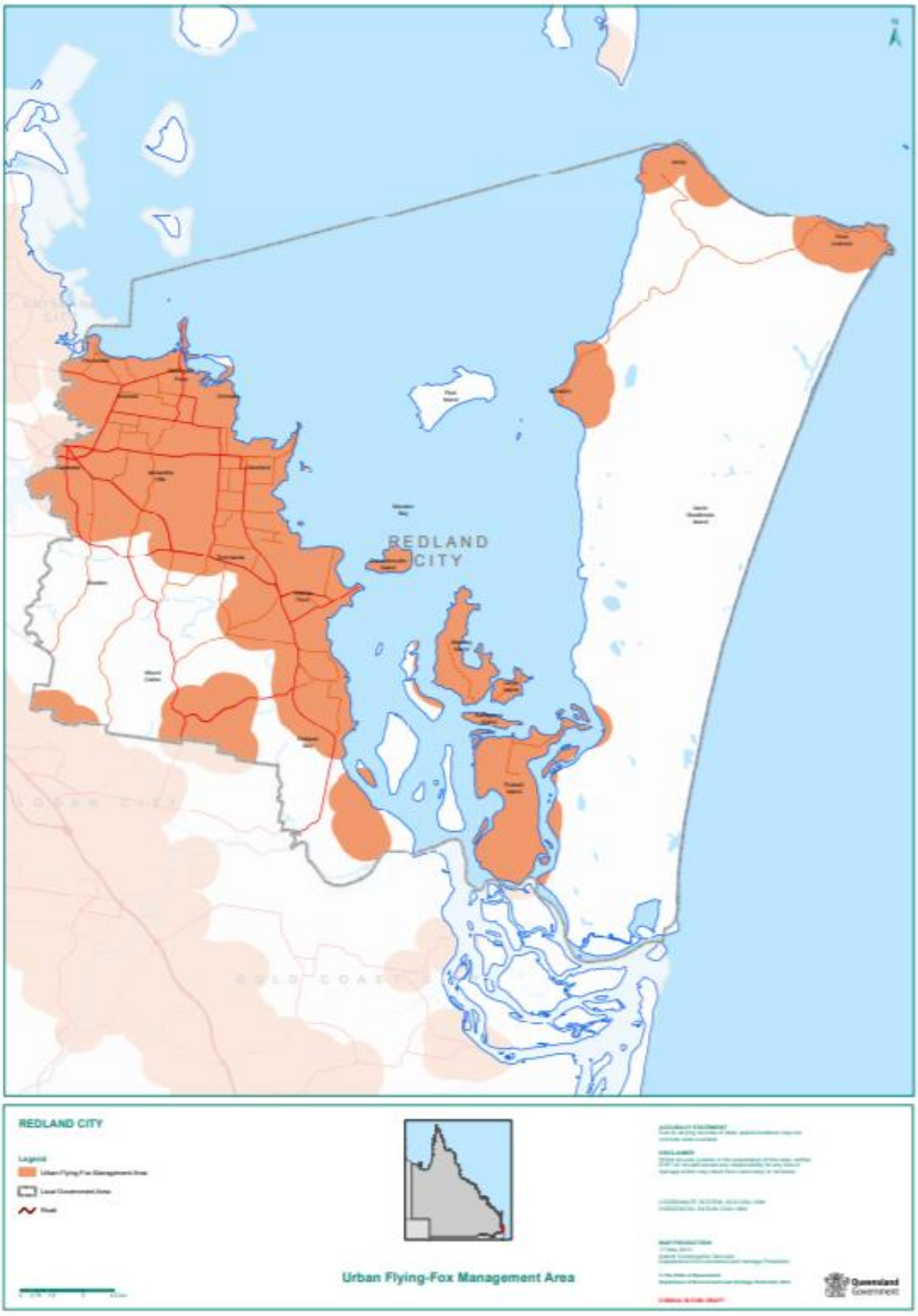
This legislation was modified in 2013 when the Queensland government introduced a new approach to flying-fox roost management empowering local governments to make decisions about how to best manage roosts. The local government 'as-of-right' authority can be enacted only in mapped Urban Flying-fox Management Areas (UFFMAs) following notification to the Queensland government, must be undertaken in accordance with relevant legislation and Codes of Practice, and it does not obligate a council in any way. The Redland City Council UFFMA map is shown in below.

A flying-fox 'roost' is defined under the NC Act as 'a tree or other place where flying-foxes congregate from time to time for breeding and rearing their young'. This definition is expanded in the *Interim policy for determining when a flying-fox congregation is regarded as a flying-fox roost under section 88c of the NC Act* (DES 2021) and differences in approvals to manage a

site based on occupancy classifications apply (see Appendix 9 for further detail). For the purposes of this Plan and because a site may change its classification during the life of the Plan, all known flying-fox sites will be referred to as roosts.

Council must still apply for a Flying-fox Roost Management Permit (FFRMP) for activities outside UFFMAs, or beyond the scope of the ***Code of Practice – Ecologically sustainable management of flying-fox roosts*** (the Roost Management Code) (DES 2020a). The ***Flying-fox Roost Management Guideline*** (DES 2020b) is also available to assist decision-making.

Any non-council landholder must apply for a Flying-fox Roost Management Permit for any activity beyond the scope of the ***Code of Practice – Low impact activities affecting flying-fox roosts*** (the Low Impact Code) (DES 2020a), which permits some low impact activities not intending to disturb flying-foxes.


REDLAND CITY
REDLAND CITY
Urban Flying-Fox Management Area

Other legislation

Vegetation Management Act 1999

The clearing of native vegetation in Queensland is regulated by the *Vegetation Management Act 1999* (VM Act), the *Sustainable Planning Act 2009* and associated policies and codes.

The type of clearing activity allowed, and how it is regulated, depends on:

- the type of vegetation (as indicated on the regulated vegetation management map and supporting maps)
- the tenure of the land (e.g. freehold or Indigenous land)
- the location, extent and purpose of the proposed clearing
- the applicant proposing to do the clearing (e.g. state government body, landholder).

Depending on these factors, clearing activities will either:

- be exempt from any approval or notification process
- require notification and adherence to a self-assessable code
- require notification and adherence to an area management plan
- require a development approval.

VM Act exemptions allow native vegetation to be cleared for a range of routine property management activities without the need for a development approval or notification. A number of VM Act exemptions may apply to clearing vegetation that is flying-fox roosting or foraging habitat. However, specific advice should be obtained from Department of Natural Resources and Mines for each proposed vegetation clearing activity.

No explicit VM Act exemptions for clearing flying-fox roosting or foraging vegetation were in place as at March 2022.

Fisheries Act 1994

All marine plants, including mangroves, seagrass, salt couch, algae, samphire vegetation and adjacent plants (e.g. melaleuca and casuarina), are protected under Queensland law through provisions of the *Fisheries Act 1994*. Approval must be gained from Fisheries Queensland to destroy, damage, or disturb any marine plant. Under the *Fisheries Act*, a 'marine plant' includes:

a) a plant (a 'tidal plant') that usually grows on, or adjacent to, tidal land, whether it is living or dead, standing or fallen;
    - The *Fisheries Act* does not define 'adjacent' as it relates to marine plants. In the absence of a definition, the Fish Habitat Management Operational Policy describes the application of 'adjacent' in terms of when a marine plant development permit application would be required for disturbance of plants in or adjacent to the tidal zone.

b) the material of a tidal plant, or other plant material on tidal land;

c) a plant, or material of a plant, prescribed under a regulation or management plan to be a marine plant.

Animal Care and Protection Act 2001

The *Animal Care and Protection Act 2001* (the ACP Act) provides for animal welfare. The ACP Act is administered by Biosecurity Queensland within the Department of Agriculture and Fisheries. The ACP Act applies to all living vertebrate animals, including wildlife. To comply with the ACP Act flying-fox management actions must not cause mental or physical suffering, pain or distress.

Civil Aviation Act 1998

The *Civil Aviation Act 1998* establishes Australia's Civil Aviation Safety Authority (CASA) functions in relation to civil aviation, with particular emphasis on safety. *Civil Aviation Safety Regulations 1998* Part 139 contains specific requirements for wildlife hazard management.

Council and/or DES should ensure aerodromes are aware of large influxes to the area so that strike risk can be managed, and Council must ensure this legislation is adhered to when considering events with aircraft.

Legislation beyond that discussed in the Plan will apply to some sites.

Appendix 2 Strategic linkages

Table 9 Strategic alignment of the Plan

Strategic document / Program	Relevant aims, objectives and initiatives
Redland City Corporate Plan 2021 – 2026 and Operational Plan 2021 - 2022	**Goal 1 – City leadership.** **Objectives:** 1.1 Have transparent, accountable processes and effective communication that builds community trust 1.2 Undertake meaningful community engagement to encourage diverse participation in decision making. **Goal 2 - Strong communities (citizen science, volunteering, ownership).** **Objectives:** 2.3 Build the community's capacity to adapt to changes in the physical, social and economic environment. **Goal 4 – Natural environment.** **Objectives:** 4.1 Manage, maintain and enhance our natural assets and ecosystems including wildlife protection and vegetation management 4.3 Encourage visitors and residents to embrace and experience our natural assets **Goal 5 – Liveable neighbourhoods.** **Objectives:** 5.1 Enhance the unique character and liveability of our city for its communities through co-ordinated planning, placemaking, and management of community assets. 5.2 Maximise economic, environmental and liveability outcomes by creating greater connectivity and linkages within and beyond our city. Redlands City Corporate Plan and Operation Plan aims to foster community trust, engagement and participation in Council's initiative to improve natural assets and ecosystems. In encouraging and educating visitors and residents to embrace the natural assets in Redlands, this aims to improve community understanding and appreciation of the importance of natural assets, wildlife and healthy ecosystems.

Strategic document / Program	Relevant aims, objectives and initiatives
Redland City Plan 2018	**Objective:** Highly scenic natural and productive rural landscapes support resilient fauna and flora communities. Throughout the city, recreation and wildlife corridors connect people, places, habitat areas, waterways, wetlands and foreshore areas. Development will be carefully managed to protect significant habitats, wildlife corridors, ecological functions and scenic landscapes. **Outcomes:** 1) The Redlands' natural areas facilitate the conservation of biodiversity and habitat for wildlife (including the koala), and the protection of ecological processes and functions. (2) Viable and resilient wildlife corridors link habitat areas and facilitate the movement and migration of native fauna throughout the Redlands and beyond. The Redland City Plan can benefit flying-foxes by increasing the quality and quantity of flying-fox habitat and specifically aims to improve rural landscapes to support wildlife. Through enhancing rural landscapes and improving wildlife corridors, this may assist in reducing flying-fox conflict in sensitive areas by providing alternative foraging and roosting sites.
Redland City Council Natural Environment Policy (ENV-001-P)	**Objective:** To protect, enhance and restore the health and viability of the City's natural terrestrial and aquatic values both on public and private lands and aquatic environments, for their inherent value and the benefit, use and lifestyle of current and future generations of our community. This includes: • Koalas and other native animal and plant populations and habitat • Core habitat areas as sanctuaries for wildlife • Safe wildlife movement corridors across the landscape • Terrestrial biological diversity and ecosystem services **Actions:** Working in partnership with the community through action-oriented collaboration, partnerships, and extension programs that empower landholders and the broader community as environmental stewards and citizen scientists. This policy aims to protect and enhance native vegetation, which will assist in the conservation of all wildlife, including flying-foxes, as well as improve ecosystem services and natural values in Redlands.
Conservation Land Management Strategy	Conservation land makes up 17.7% of the Redlands, including conservation areas, nature refuges, bushland refuges, nature belts, creek corridors, urban habitat, conservation coastal foreshores, wetlands, drainage reserves, road reserves. **Objectives and strategies:** Areas of high ecological integrity prioritised for maintenance, vegetation management (including increasing abundance and diversity of native plant species, controlling weeds), support riparian corridors, assess risk to EVNT species and habitat, manage threats to wildlife, maintain firebreaks/buffers, controlled burns, water quality, education and interpretation.

Strategic document / Program	Relevant aims, objectives and initiatives
Wildlife Connections Plan 2018-2028 and supplementary *Wildlife Connections Action Plan 2018 - 2023*	**Objectives:** These Plans aim to provide habitat connectivity for native species, facilitate the continuity of ecological processes through healthy and resilient animal and plant populations and improve and protect corridor habitat. **Actions:** Actions outlined in these Plans are to identify, prioritise and assign areas for planting and create buffer of native vegetation to reduce the risk of edge effects. These Plans will assist in enhancing connectivity and habitat quality for all wildlife and plant species. These Plans can benefit flying-foxes through increasing available flying-fox habitat, which may assist in reducing conflict with flying-foxes in sensitive areas.
Redlands Coast Bay and Creeks Plan 2021-2031 and supplementary Action Plan 2021-2026	**Objectives:** To protect existing instream, wetland and creek bank vegetated ecosystems, and to undertake restoration of degraded assets and improve habitats, biodiversity, connectivity and natural form and flow. This action plan will assist in improving habitat for all wildlife species, including flying-foxes. In restoring habitats around wetlands and creeks, this may aid in mitigating heat-stress impacts in for flying-foxes by improving vegetation health and increasing complexity in vegetation strata.
Redland City Council Community and Environment Education Program (CEEP) Framework 2021	**Aim:** To build understanding and advocacy for the Redlands environment through informative, interactive and engaging education programs to early learning, school and adult education groups. Fostering a sense of appreciation and understanding of natural assets and a connecting the community to the local environment will inspire residents to protect the native flora and fauna on the Redlands Coast for future generations. This program will assist in the protection of flying-foxes and other important wildlife species by instilling the importance of keystone species in providing ecosystem services, which benefit the entire community.
Prioritising species and ecological communities for future management in the Redlands 2021 (Eco Logical)	This report identified the GHFF as the highest priority species and land clearing or land reclamation as the most significant key threatening process. Recommendations from this report include: Preventing land clearing, improving landscape connectivity and targeted education and awareness programs.
Winter Plants for Wildlife (Healthy Land and Water)	**Objective:** Distribution of 15,000 winter forage plants used by the Grey-headed flying-fox and other wildlife to community organisation and public and private landholders for planting in targeted locations across south-east Queensland to mitigate food shortage. Land for Wildlife will be participating in the roll out of this program. Planting areas have been mapped in consultation with local governments and the South-east Flying-fox Network to identify priority areas and exclude areas that may exacerbate conflict with flying-foxes (e.g. by not encouraging foraging near sensitive sites)
Land for Wildlife South East Queensland	**Objective:** This is a voluntary program that encourages and assists landholders to manage wildlife on their properties supported by Council. It has a network of over 5,000 properties that are being managed for conservation and nearly 8,000 hectares of habitat are currently being restored which may create foraging opportunities for flying-foxes. Another initiative that assists flying-fox conservation is the erection of wildlife-friendly fencing on

Strategic document / Program	Relevant aims, objectives and initiatives
	some properties. .
One million native plants by 2026 (Redland City Council initiative)	**Aim:** To create a network of wildlife corridors by planting 1 million native plants as part of the commitment to a healthy, natural environment. Similar to the Winter Plants for Wildlife initiative, consideration regarding planting locations is required to ensure synergistic outcomes that assist in the conservation of flying-foxes without exacerbating conflict at sensitive sites.
Voluntary Conservation Agreement Program	**Objective:** The Voluntary Conservation Agreement Program is a program in which arrangements are made between Council and private landholders to encourage landholders to conserve and manage bushland on private property. This program gives landholders guidance on how they can best manage bushland on their property, providing benefits to the local ecosystem, wildlife species and economic and natural value to landholders. This program can assist in protecting habitat for flying-foxes on private property for those wanting to be a part of the program, providing more habitat for flying-fox foraging and roosting, whilst landholders are benefitted by flying-foxes ecosystem services.
Waterways Extension Program	**Objective:** This program aims to assist private landholders in enhancing the health of waterways in Redlands. The voluntary program assists landholders with waterway management advice and opportunities for funding for natural resource management, such as weed control and revegetation efforts and rehabilitating degraded areas. This program may assist in increasing available habitat for wildlife and flying-foxes through improving riparian habitats. This program encourages community connection and allows landholders to feel empowered in improving the natural value of their property, while providing benefits for flora and fauna communities.
Rural Support Program	**Objective:** Similar to the Voluntary Conservation Agreement Program, The Rural Support Program encourages landholders, specifically in rural areas, to improve environmental outcomes on their properties. This voluntary program provides landholders with flora and fauna identification and monitoring services, development of regeneration programs, property management advice and the opportunity to engage with other landholders. Through regeneration efforts and improving habitat on rural properties, this program may increase the available habitat for flying-foxes in rural areas, aiding in the conservation outcomes for flying-foxes, whilst potentially decreasing conflict in sensitive urban areas.
Your Backyard Garden Program	**Objective:** This program is an initiative targeted to landholders in urban areas near bushland reserves or within wildlife corridors. This program aims to enhance urban backyards to be more environmentally and wildlife friendly. Advice is given to landholders on environmental weeds, native plants and wildlife local to the area, and how to make backyards more attractive to wildlife, whilst ensuring that pets are happy and wildlife remain safe. This program can allow urban landholders to feel empowered in improving their local environment, and can provide flying-foxes with safe spaces to forage in urban areas.

Appendix 3 Statement of Management Intent

Statement of Management Intent

For Flying-Fox Roost Management In Redland City Council

This Statement of Management Intent was endorsed by Council in 25 February 2015 and has effect from 25 February 2015 until superseded.

1. Authority

Under the *Nature Conservation Act 1992*, the State Government introduced a new approach to flying-fox roost management to allow local governments to make their own decisions about how to best manage individual flying-fox roosts on Council controlled lands in designated Urban Flying-Fox Areas. The legislation authorises local government to act on these decisions without the need for a permit under the *Nature Conservation Act 1992*.

Outside an UFFMA, local governments require a flying-fox roost management permit (FFRMP) from Environment and Heritage Protection to undertake flying-fox management activities. A non-council applicant requires a FFRMP irrespective of the location of the roost.

If a roost is on **private land**(s), low impact activities may be undertaken by the landholder(s) as described under the '*Code of practice – Low impact activities affecting flying-fox roosts*'. Council does not become involved in approvals for these activities.

2. Purpose

The purpose of this Statement of Management Intent (SoMI) is to articulate the approach that Redland City Council will take in the management of flying-fox roosts in designated Urban Flying-Fox Management Areas in Redland City Council.

3. Location of the UFFMA in Redland City Council

An UFFMA map for Redlands (Attachment 1) and has been drawn from www.ehp.qld.gov.au of the EHP. This map may be updated from time to time by State Government.

4. Council intentions and considerations

Where Council **owned** or managed land is used as a roost site by flying-foxes, Council will:

- Not disperse flying-foxes or destroy flying-fox roost sites
- Continue to reinforce education to the community
- Continue to revegetate previously used roosts in areas of less conflict
- Identify sites for enhancement as potential future roost sites
- Continue to monitor and map our roost sites in partnership with Department of Environment and Heritage Protection and volunteers
- Continue to liaise closely with other local Councils, researchers and Department of Environment and Heritage Protection officers
- Advocate on behalf of the community to State Government agencies to assist with flying-fox management
- Ensure that Council management for flying-foxes is undertaken in accordance with the *Code of Practice – Ecologically sustainable management of flying-fox roost'; Procedure 3070-001-002 Working around Flying-foxes and Roost Sites* and any other legislative requirements.

5. Related Documents and Policy

- *Animal Care and Protection Act 2001*
- *Environmental Protection and Biodiversity Act 1999*
- *Nature Conservation Act 1992*

Queensland Government

- *Code of Practice – Ecologically sustainable management of flying-fox roosts.*
- *Code of Practice – Low impact activities affecting flying-fox roosts.*
- *Flying-fox Roost Management Guideline*

Redland City Council

- *Redland City Council Procedure POL 3070-001-002 'Working around flying-foxes and roost sites'*
- *Redlands Flying-fox Education and Communication Plan*

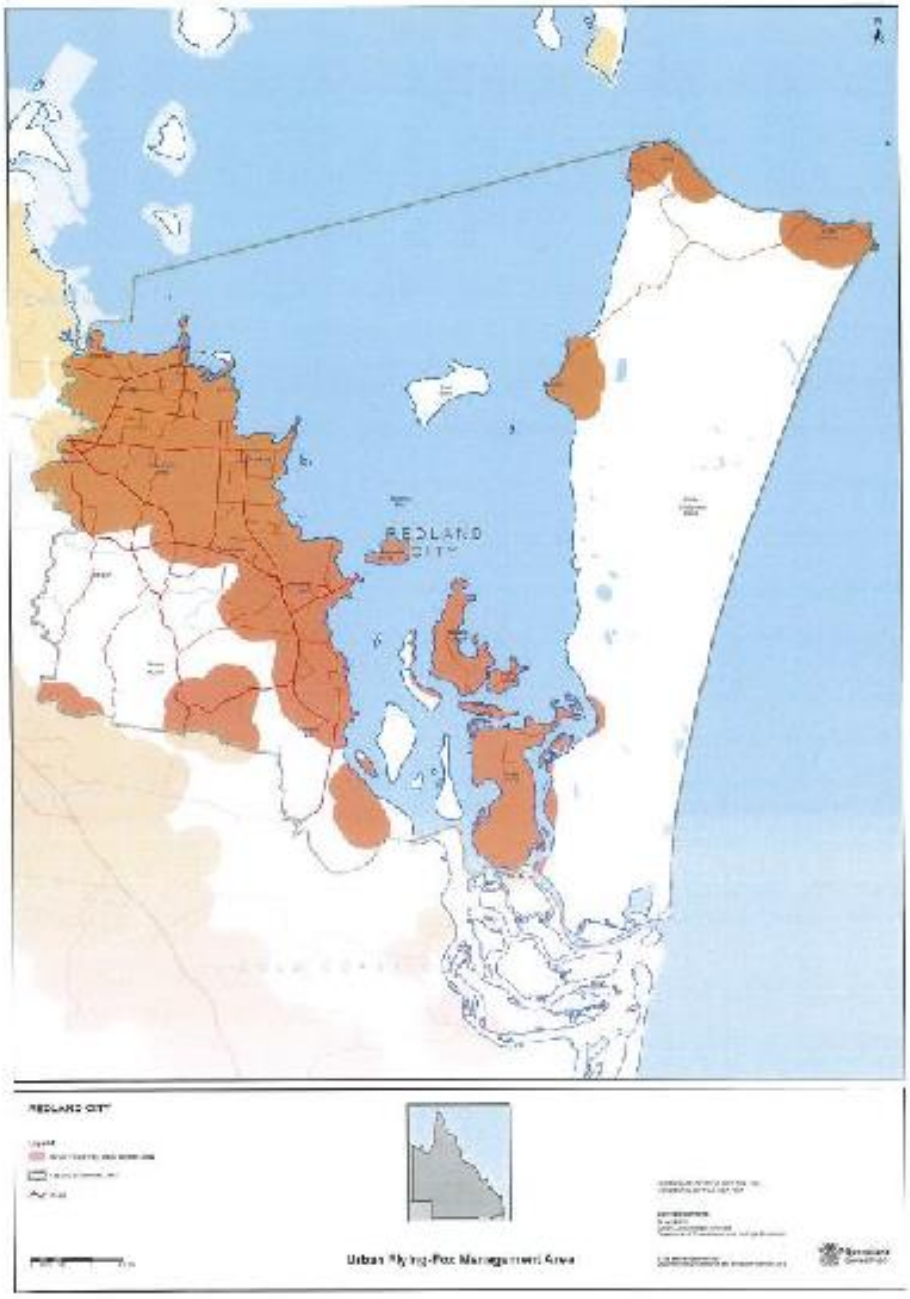
Australian Government

- *National Recovery Plan for the Grey-headed Flying-fox*

6. Further information

Contact Council on 3829 8999 to discuss this SoMI for flying-fox Management in Redland City Council.

Contact EHP website further information on the State Government flying-fox framework and permits required for flying-fox roost management permit (FFRMP) outside an UFFMA.



To view the SOMI please visit: https://www.redland.qld.gov.au/info/20285/living_with_wildlife/647/living_near_flying_foxes

Appendix 4 Human and animal health

Flying-foxes, like all animals, have the potential to carry pathogens that can cause human health issues. In Australia those of concern are Australian bat lyssavirus (ABLV) and Hendra virus (HeV).

Outside an occupational cohort (e.g. wildlife carers, vets, biologists) the risk of human exposure to these viruses is extremely low. Coming into contact with bat faeces, urine or blood do not pose a risk of ABLV exposure, nor do living, playing or walking near bat roosting areas (Queensland Health 2020).

There has been one case of ABLV in a domestic dog (Arthur 2013) and two cases of HeV in domestic dogs (following close contact with infected horses) (DPI 2014). Therefore, while the likelihood of infection is extremely low, as a precaution people should prevent their pets from coming into contact with bats. This may include keeping pets inside at night, particularly when flying-foxes are foraging on flowering or fruiting trees nearby, and, keeping dogs on a lead when walking near a flying-fox roost (RSPCA 2019). If a pet owner is concerned or suspects their pet has come into contact with a bat (including microbats), veterinary advice should be sought immediately.

For further information concerning human health risks and flying-foxes go to the Queensland Health and Biosecurity Queensland websites.

Flying-fox safety is simple

The risk of humans contracting an illness from flying-foxes or other bats is already very low, and there are some easy ways to reduce that risk even further:

- **No touch = No risk. Never touch or handle bats** unless you are trained, using appropriate personal protective equipment and vaccinated against ABLV.
- Instead, if you find an injured bat, **contact a professional** for assistance: Redlands Wildlife Rescue 3833 4031 or the RSPCA Ambulance (1300 ANIMAL).
- **Vaccinate horses** against Hendra virus where possible. If horses do become sick for any reason, isolate them early while awaiting test results.
- **Protect horse food and water** from contamination and maintain **standard hygiene practices** in interacting with horses and cleaning.
- **Educate children** - look but don't touch.
- Maintain standard **pool treatment**.
- **Modify and maintain rainwater tanks**: cover the tank with <1mm mesh and fit a first flush device; trim/remove overhanging vegetation; regularly disinfect the tank and inspect it 6-12 monthly for bottom sediment and flush tank.

Important

In the rare instance a person is bitten or scratched by a bat, wash the wound for five minutes (do not scrub), apply antiviral antiseptic (e.g. Betadine) and seek immediate medical advice. Effective pre- and post-exposure vaccinations are available.

Australian bat lyssavirus

ABLV is only spread to humans if saliva of an infected bat comes in contact with mucous membranes or broken skin, such as through bat bites or scratches. Less than 1% of healthy flying-foxes carry ABLV and approximately 7% of sick or injured bats (Queensland Health 2019). Effective pre- and post-exposure vaccinations are available to prevent ABLV from developing.

ABLV cannot be contracted from flying-fox excrement, including using or drinking water from rainwater tanks, or swimming in a pool, where bat excrement is present (Queensland Health 2017a). For households using rainwater for food preparation and drinking, the risk of getting a gastrointestinal illness from bat faeces is no different than for other animals, including birds (Queensland Health 2017a). Maintaining standard chemical treatment of swimming pools can adequately manage the effect of bat faeces (Queensland Health 2017a).

Hendra virus

HeV infection requires close contact with an infected horse – direct transmission from bats to humans has not been reported – and appropriate husbandry and HeV vaccinations can prevent infection in horses (Queensland Health 2018).

Coronaviruses

Coronaviruses are found in bats, birds and other animals worldwide. Coronaviruses isolated from Australian bats are not closely related to COVID-19 and no human health implications have been identified (WHA 2020).

General health considerations

All animals, carry bacteria and other microorganisms in their guts, some of which are potentially pathogenic to other species.

Bat urine and faeces should be treated like any other animal excrement. Viruses are not transferred to humans from bat urine or faeces. As with any accumulation of animal faeces (bird, bat, domestic animals), fungi or bacteria may be present and care should be taken when cleaning faeces. This includes wetting dried faeces before cleaning or mowing, wearing appropriate PPE and maintaining appropriate hygiene. If disturbing dried bird or bat droppings, particulate respirators should be worn to prevent inhalation of dust and aerosols. See 'Work with bird and bat droppings' for detail.

Contamination of water supplies by any animal excreta (birds, amphibians and mammals such as flying-foxes) poses a health risk to humans. Household tanks should be designed to minimise potential contamination, such as using first-flush diverters to divert contaminants before they enter water tanks. Trimming vegetation overhanging the catchment area (e.g. the roof of a house) will also reduce wildlife activity and associated potential contamination. Tanks should also be appropriately maintained and flushed, and catchment areas regularly cleaned to remove potential contaminants.

Public water supplies are regularly monitored for harmful microorganisms and are filtered and

disinfected before being distributed. Management plans for community supplies should consider whether any large congregation of animals, including flying-foxes, occurs near the supply or catchment area. Where they do occur, increased frequency of monitoring should be considered to ensure early detection and management of contaminants.

Refer to Queensland Health for further information about bats and health.

Appendix 5 Flying-fox posters and signage design

Appendix 6 Community survey results

A total of 281 participants submitted survey responses, with the majority of these engaging through Facebook advertising (48%) and directly through Council's website (46%). 75% of respondents identified as Redlands Coast residents, 26% identified as visitors, with 6% identifying as Redlands Coast business owners. Percentages are rounded, and as respondents were often able to choose multiple responses totals may exceed 100%. Key results are summarised below, all were considered in developing the Plan and additional detail can be provided on request to Council.

The majority of respondents reported living or owning a business near a flying-fox roost (52%), with the remaining not living or owning a business near a flying-fox roost (38%), or being unsure (11%) (Appendix 6 Figure 1).

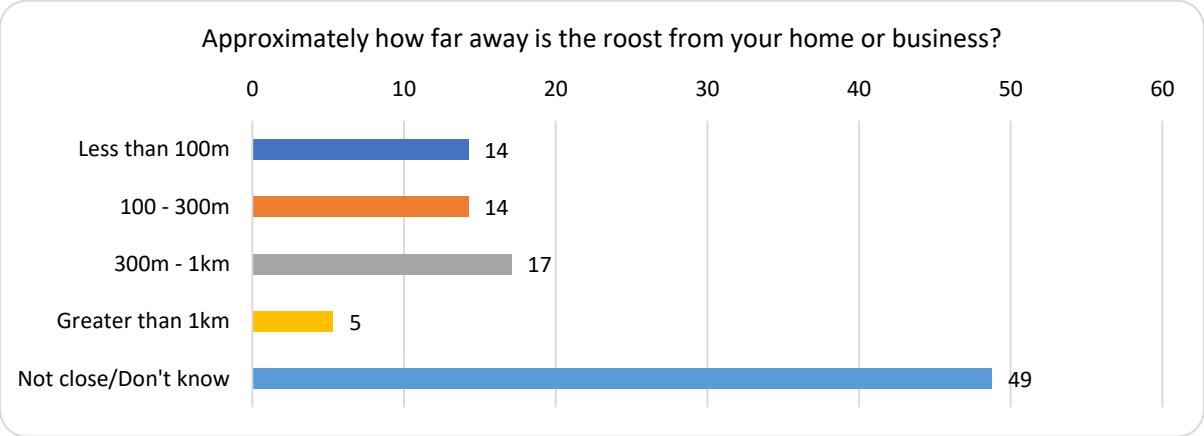


Figure 1 Percentage of responses given when prompted 'Approximately how far away is the roost from your home or business?'. Numbers are given as percentages, rounded to the nearest whole number.

The majority of all respondents strongly agreed or agreed that flying-foxes are important for the environment and should be protected (80%), and that flying-foxes and humans should share the urban environment (78%) (Figure 2). 64% of respondents disagreed that flying-foxes are a nuisance and should be managed (Figure 2).

Most respondents like it when flying-foxes visit their garden (64%) and believe that Council should not disturb flying-foxes (67%) (Figure 2). Most respondents believed that Council should balance conservation and resident amenity (69%), with an overwhelming majority of resident believing that Council should protect vegetation and other environmental values in parklands and bushland areas (95%) (Figure 2).

Responses to other statements were fairly evenly distributed, as shown in Figure 2.

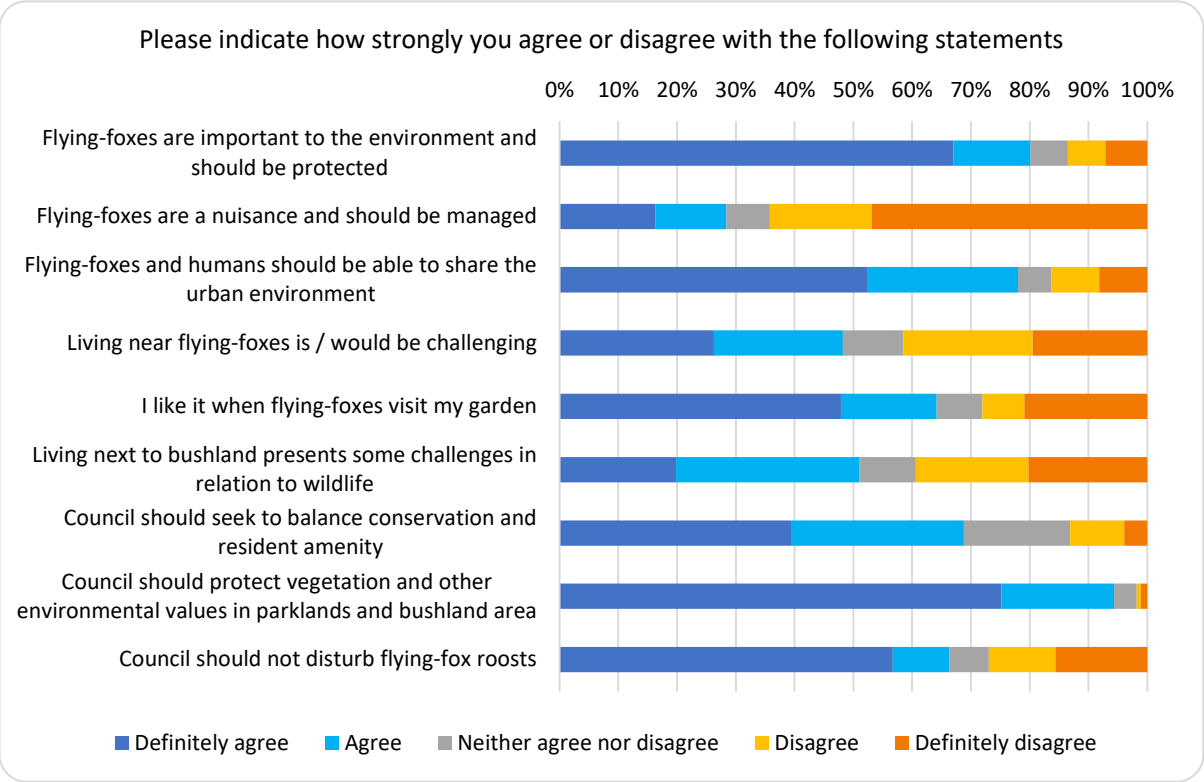


Figure 2 Responses to various statements about flying-foxes.

The majority of respondents have had positive experiences with flying-foxes on the Redlands Coast 166 respondents; (59%), 63 respondents (22%) negative, and 51 (18%) neutral (Figure 3). Where people reported being impacted, the majority were at home (Figure 4).

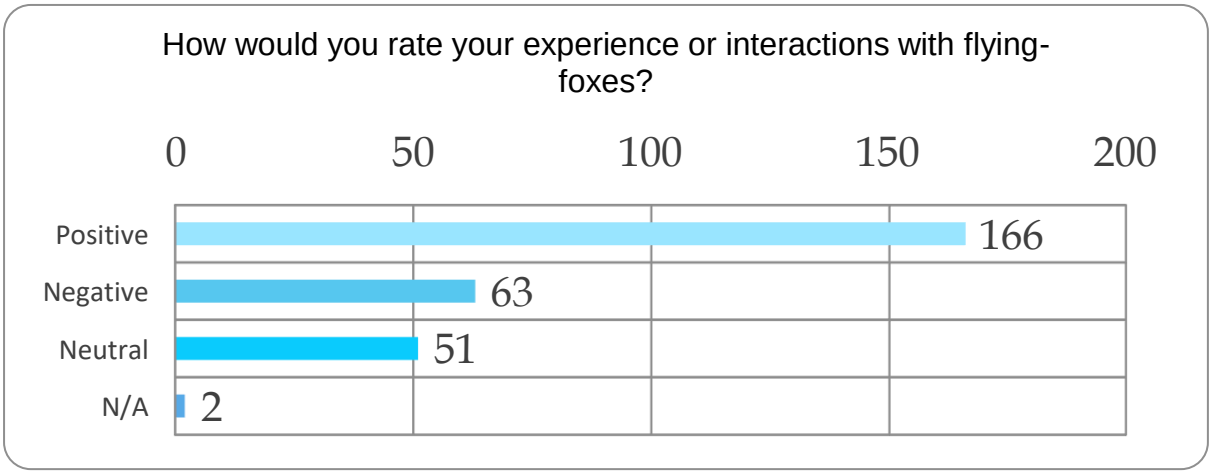


Figure 3 Rating of experience or interactions with flying-foxes on the Redlands Coast

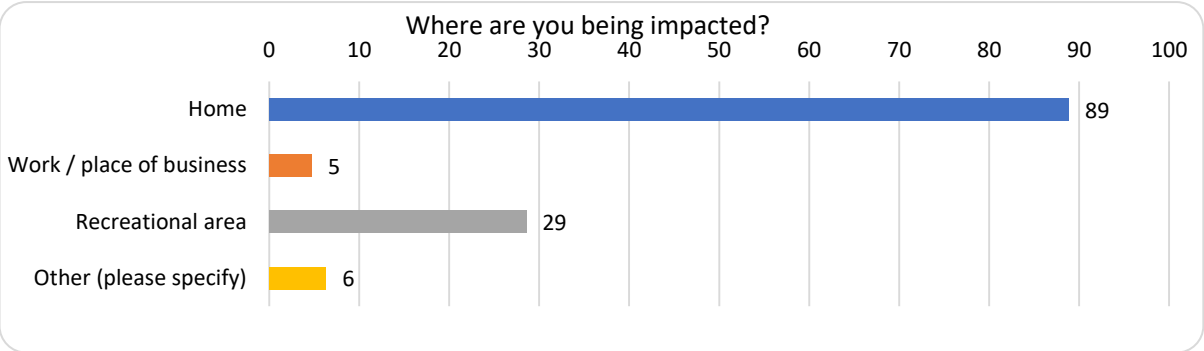


Figure 49 Percentage of responses given when asked 'Where are you being impacted?'. Values are given as percentages, rounded to the nearest whole number.

When respondents were asked to choose topics they were concerned or interested about regarding flying-foxes, the majority of respondents were concerned/interested in misinformation about flying-foxes (64%), flying-fox habitat protection (63.3%), flying-fox conservation (61.5%) and flying-fox welfare (59%) (Figure 5). The next most cited concerns were mess from droppings (38%), smell (27.4%), fear of disease (27%), noise (26%), feeding in my yard (17%), damage to vegetation (16%), fruit loss at orchards (10%) and visual amenity (5%) (Figure 5). The range of 'other' responses are shown in Table 1.

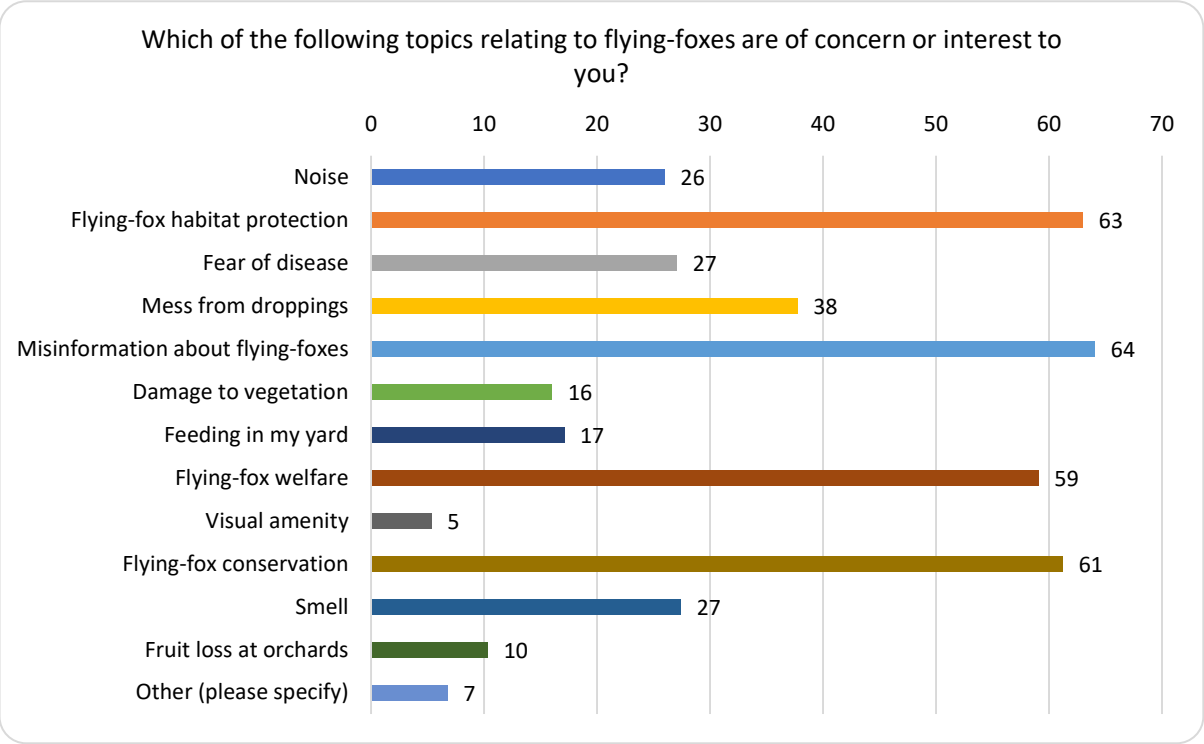


Figure 5 Percentage of responses given when prompted 'Which of the following topics relating to flying-foxes are of concern or interest to you?'.

Table 1 Other responses to question in Figure 5 (7% total responses) in alphabetical order.

Response
Actually have management plans in place for alternative sites that these creatures can go to, away from urban residential properties and parkland designated for children and other human recreational activities.
Council not clearing or mowing because of the flying foxes. This is causing more snakes, rats and toads coming into our yard
Damage to paint on our cars and van.
Damage to paintwork house & car
Destruction of already limited green space and their ecosystems. Removal of a feature I enjoy about my home.
Dispersal of Flying-foxes
Ecosystem services
Education of the public
Humans causing harm to flying foxes because of uneducated information.
I have lived on my block of land for over 50 years and used to own a portion of the land that is now in Council ownership. Until recent years there was never a flying fox roost there but I think they have moved into a suburban park because of loss of natural habitat due to development in the Redlands. I am not anti flying fox but don't feel they belong in suburban parks,
Misconceptions about them being dirty, etc.
None, we keep pushing wildlife out of existence to make more room for humans. How about we start the conversation on the damages humans cause. We need to reduce human breeding and introduce a license to bring children into the world.
Population decline and what that will mean for our environment and economy.
Roost disturbances especially in baby season.
Tendency for some councils to insist on dispersal when it doesn't work and creates more problems and increases unfounded fears, rather than invest in public education.
That they often get to my pawpaws before I do is a small price to pay for the joy of having wildlife around. I have experienced the ecological sterility of Europe and it is not good.
The clearing of native roosting and feeding habitat crucial to the survival of the species
The stress of living near a colony is debilitating and harmful to a human beings health.
The undeserved 'bad rap' that flying foxes get and Council dispersing colonies of these amazing and important animals

When comparing topics of concerns from respondents within the different distance categories from flying-fox roosts, the top four concerns for respondents that live within 100 m of a roost were smell and flying-fox welfare (70%), mess from droppings (67.5%) and misinformation about flying-foxes (62.5%) (Figure 6). Concerns such as smell, mess from droppings, noise, fear of disease, damage to vegetation and visual amenity were mentioned most often by respondents that live less than 100 m away from a roost (Figure 6). These concerns generally decreased in the percentage of responses as distance from a roost increased (Figure 6). Though 35-38% of respondents within 100 m of a roost were concerned about flying-fox habitat protection and flying-fox conservation, respondents who lived more than 100 m away from a flying-fox roost cited these two concerns almost twice as much (Figure 6).

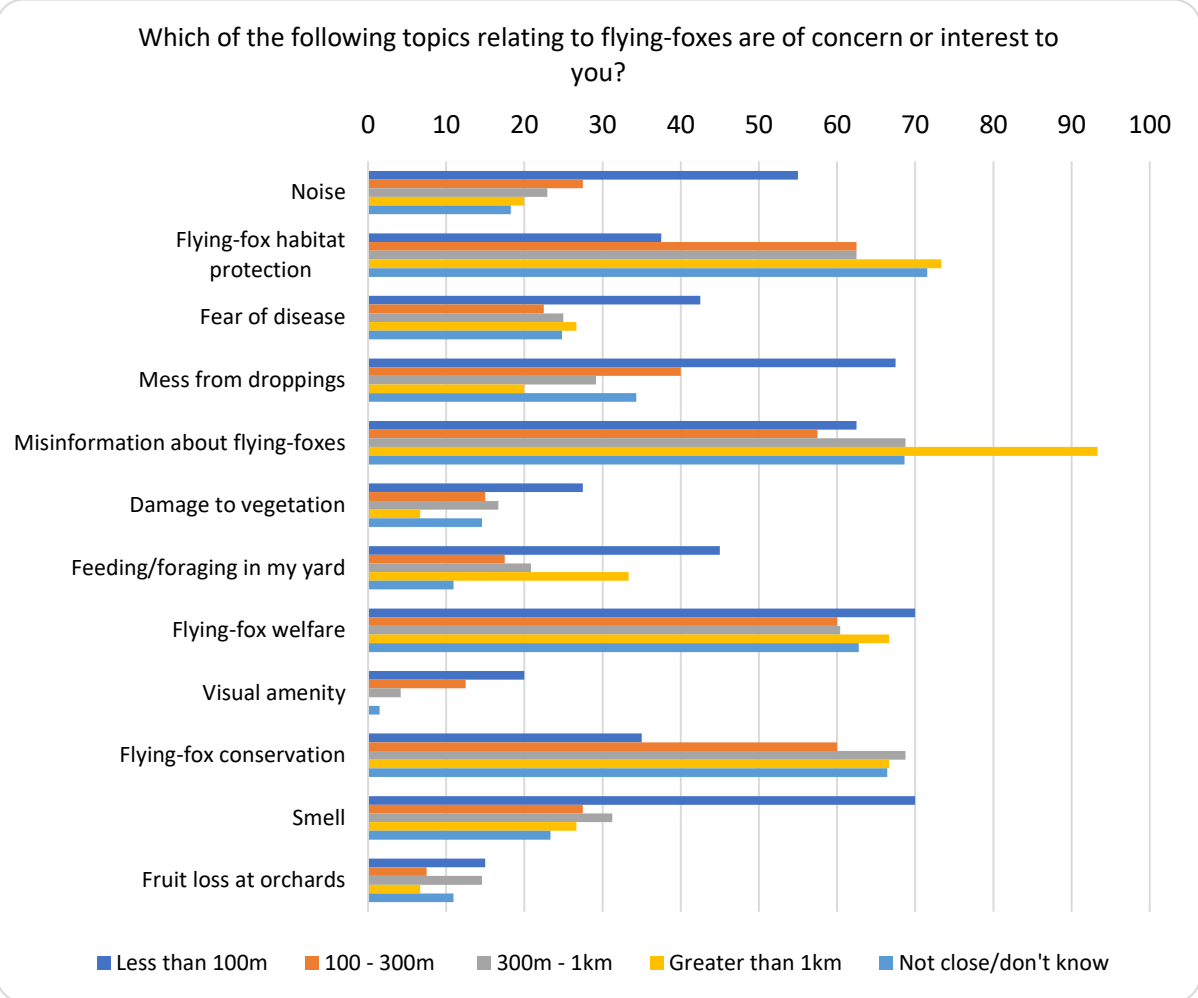


Figure 6 Percentage of responses given when promoted 'Which of the following topics relating to flying-foxes are of concern or interest to you?'. Percentages were broken down into distance categories based on the distance of the respondent's home or business from a flying-fox roost.

Of the respondents who answered that they live or own a business near a flying-fox roost, 35% felt subsidies would help manage flying-fox impacts, 21% were unsure, and 43% of did not believe they would assist (Figure 7).

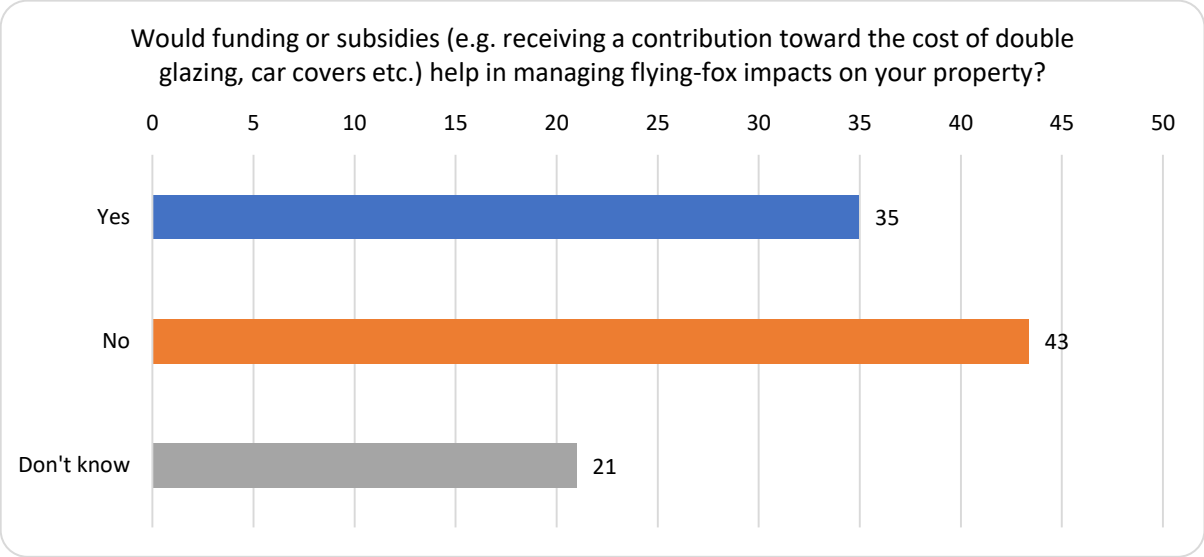


Figure 7 Percentage of responses given when prompted 'Would funding or subsidies (e.g. receiving a contribution toward the cost of double glazing, car covers etc.) help in managing flying-fox impacts on your property?'.

When percentages of respondents living near a flying-fox roost were broken down into distance categories (<100 m, 100 m - 300 m, 300 m – 1km, or >1 km), respondents living between 100 m and 300 m from a roost were most receptive to the idea of subsidies (Figure 8).

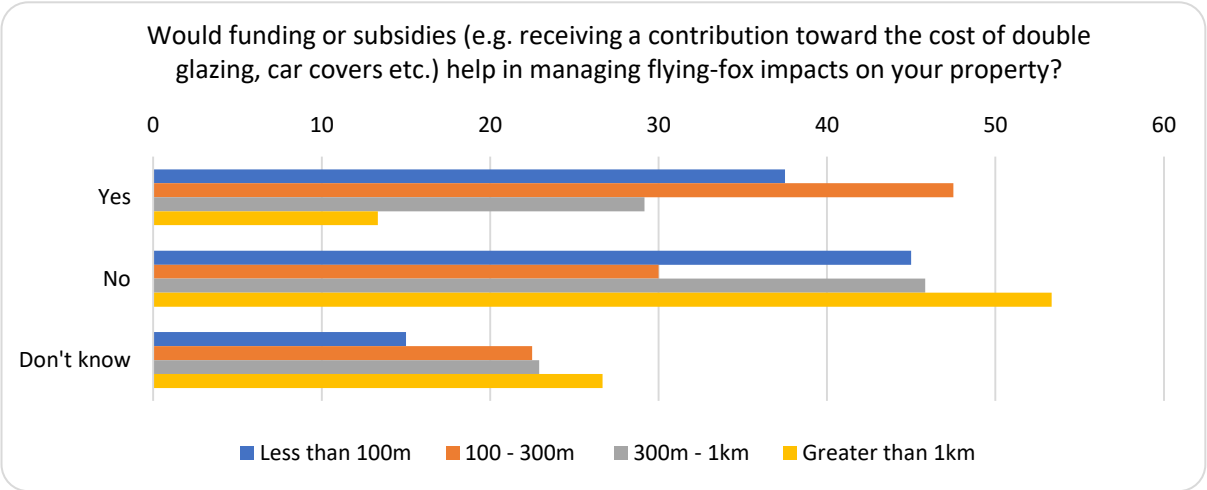


Figure 8 Percentage of responses given when prompted 'Would funding or subsidies (e.g. receiving a contribution toward the cost of double glazing, car covers etc.) help in managing flying-fox impacts on your property?'. Percentages broken into categories based on the distance of the respondent's home or business from a flying-fox roost.

Among the 219 respondents for the below prompt (excluding responses of not applicable), the most popular measures that were considered potentially valuable/effective in managing impacts experienced from flying-foxes were wildlife friendly netting and periodic cleaning (both 54%), and car covers (53%) (Figure 9). Double glazing windows, clothesline covers, pool covers and loan of pressure cleaners from Council and subsidised outdoor cleaning were still relatively popular management measures (41%, 41%, 34%, 32% and 29%, respectively). Indoor air deodoriser and backyard tree replacement were the least popular management measures listed (17% and 11%, respectively) (Figure 9). The 43 other responses (20%) responses could be categorised into flying-fox protection/no management (n=13), culling[2] (n=10), creating habitat in low conflict locations (n=5), dispersal (n=4), sharing roost locations for new owners (n=2), avoiding development near flying-fox habitat (n=2), creating buffers including canopy-mounted sprinklers (n=2), Council cleaning (n=1) and subsidised tree replacement/pruning (n=1). Three respondents stated they were not in favour of any provided options but did not suggest alternatives.

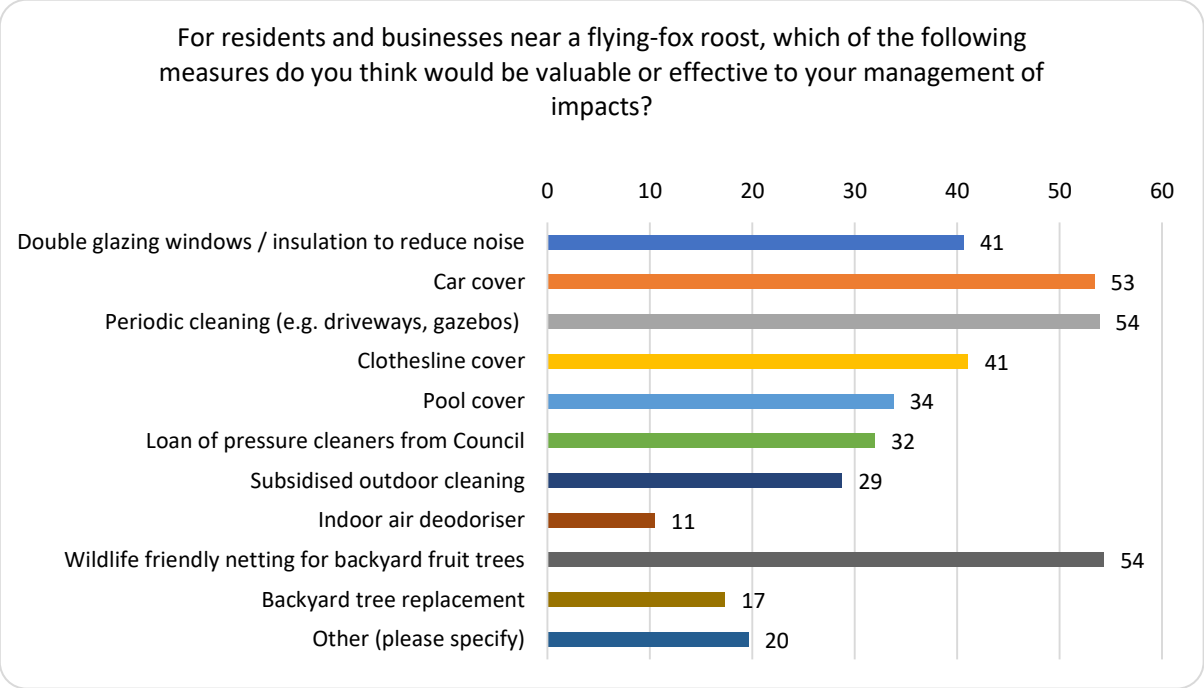


Figure 9 Percentage of responses given when prompted 'For residents and businesses near a Flying-fox roost, which of the following measures do you think would be valuable or effective to your management of impacts?'.

[2] Culling is not a legal or appropriate option – see Section 4.2.

When breaking down these responses into distance categories from flying-fox roosts, respondents living within 100 m of a flying-fox roost cited periodic cleaning (58%), car covers (45%) and double-glazed windows (43%) above all other measures (Figure 10). Measures such as double-glazing windows, periodic cleaning, subsidised outdoor cleaning, and indoor air deodorisers typically decreased in the percentage of responses as distance from a roost increased (Figure 10). Wildlife friendly netting was cited as a highly popular measure, especially for respondents in the categories 100 m – 300 m, 300 m – 1 km and greater than 1 km from a flying-fox roost (Figure 10).

Among the 'other' responses given, 21% of these responses mentioned alternative roosting habitat, 19% of responses mentioned both dispersal and culling. It is important to note that culling of any native animal, including all species of flying-foxes is illegal. 16% of these responses mentioned the importance of town planning and disclosing the proximity of properties to a flying-fox roost to prospective buyers to ensure everyone is aware of the potential impacts that may be experienced if living near a flying-fox roost. Other measures mentioned were education, maintenance of buffers via vegetation trimming/removal and sprinklers, as well as having a giving priority to those most effected by flying-fox roosts.

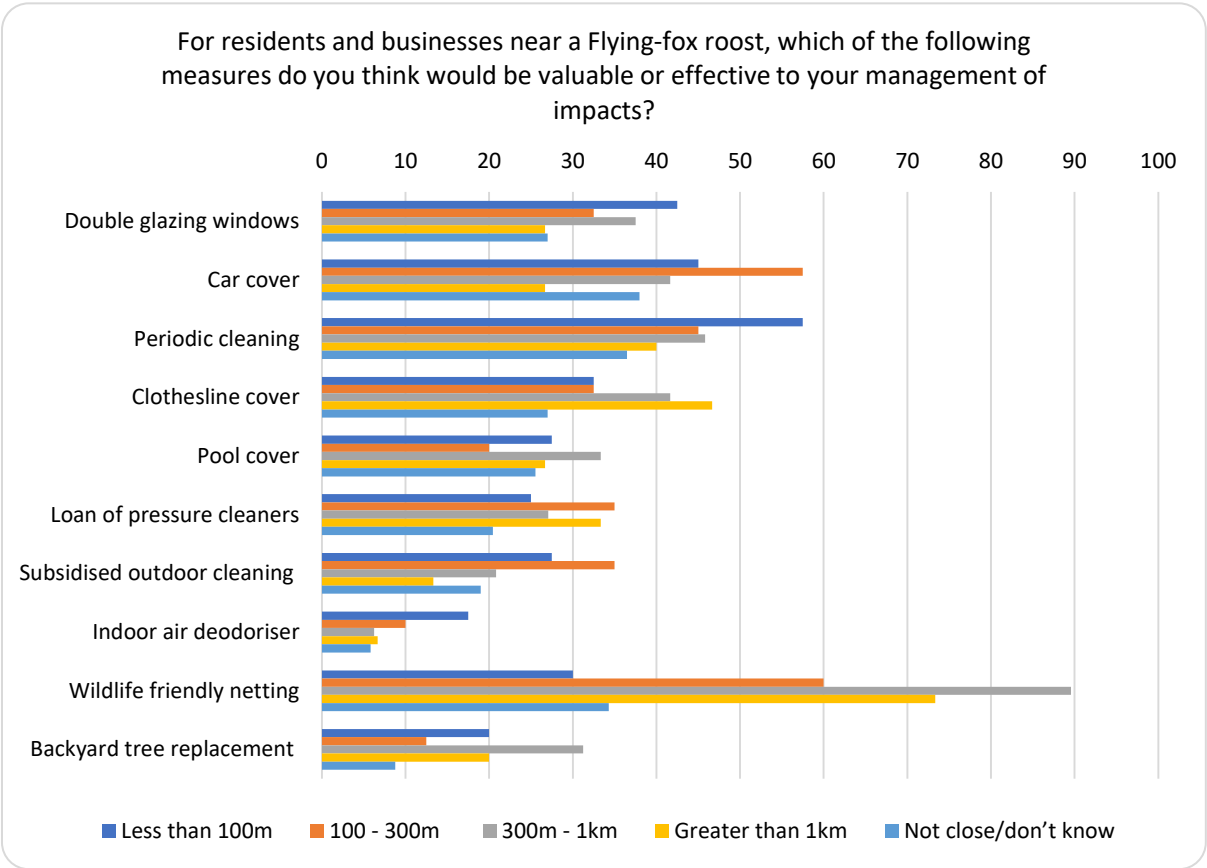


Figure 10 Percentage of responses given when prompted 'For residents and businesses near a Flying-fox roost, which of the following measures do you think would be valuable or effective to your management of impacts?'. Percentages were broken down into distance categories based on the distance of the respondent's home or business from a flying-fox roost.

The majority of respondents (51%) believe that Council should prioritise funds for residents and businesses that reside closest to a flying-fox roost (Figure 11). The next most cited answer was for Council to develop a ranking system (38%), followed closely by Council prioritising funds to those located near flying-fox roosts with the largest population numbers (36%) (Figure 11). For the 'other' responses given, 32% of these mentioned that no subsidies should be given or that it was peoples' choice to continue living close to flying-fox roosts. 22% of the 'other' responses mentioned that funding should be used for education and/or protection of flying-foxes and their habitat; 16% mentioned relocation of flying-foxes to areas outside of urban centres.

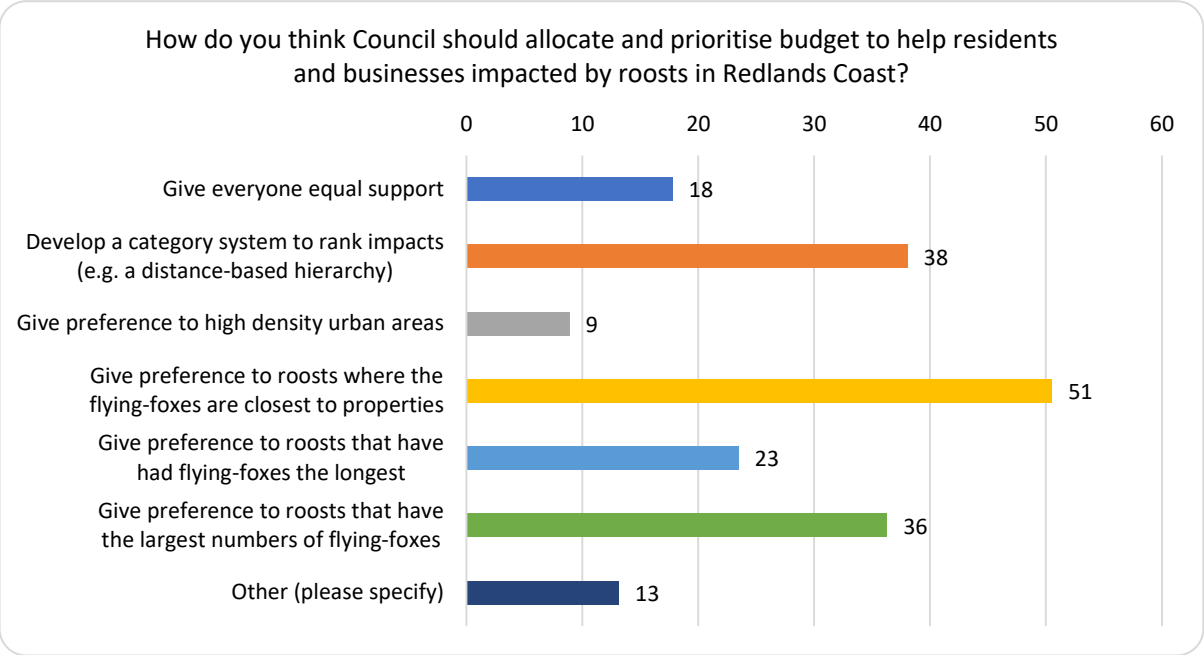


Figure 11 Percentage of responses given when prompted 'How do you think Council should allocate and prioritise budget to help residents and businesses impacted by roosts in Redlands Coast?'.

When comparing respondents' answers based on distance of their home/business from a flying-fox roost, regardless of the distance of respondents from a flying-fox roost, most respondents believe that Council should prioritise help to residents and business closest to flying-fox roost (Figure 12). The next most popular answer for respondents less than 300 m from a flying-fox roost was for Council to develop a category system to rank impacts (Figure 12). This option was also the second most cited response for those that did not live close to a flying-fox roost/did not know if they lived close to a flying-fox roost (Figure 12). There was generally low support from respondents to give preference to high density urban areas regardless of their distance from a flying-fox roost (Figure 12). Notably, giving everyone equal support had very low support from respondents who lived/owned a business within 100 m of a flying fox roost (Figure 12).

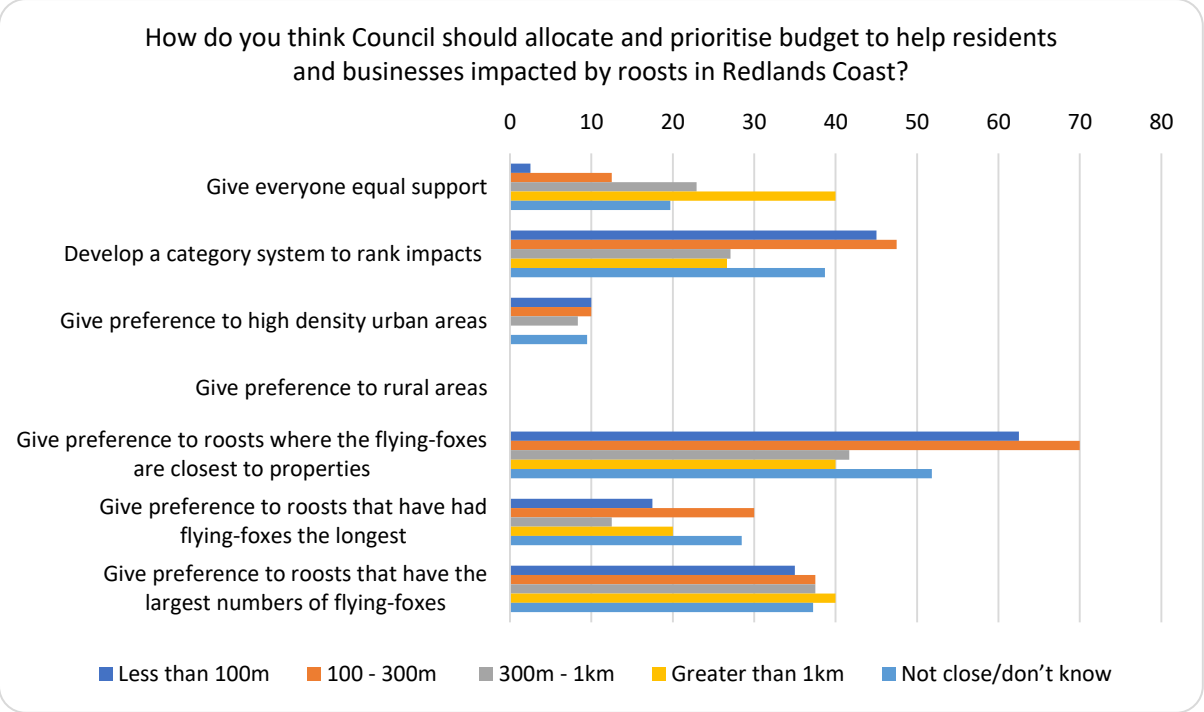


Figure 12 Percentage of responses given when prompted 'How do you think Council should allocate and prioritise budget to help residents and businesses impacted by roosts in Redlands Coast?'. Percentages broken down into distance categories.

Of the respondents who answered as having a negative experience with flying-foxes (63 respondents), a majority reported experiencing impacts in the early evening (75%) and late evening (73%) (Figure 13). This was followed by impacts being experienced in the early morning (49%), afternoon (41%) and finally, the least number of impacts reported in the late morning (35%) (Figure 13). Three of the other responses listed all day as the times they experienced impacts, therefore these additional three responses were added into the calculations for each time category. The remaining four other responses already listed times that were included in the below graph, or mentioned that they were not currently impacted, therefore were not added to the percentage calculations.

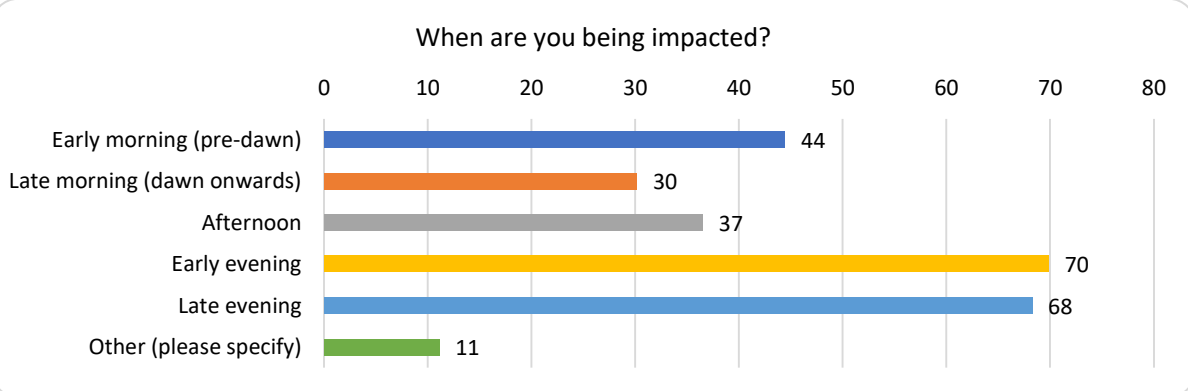


Figure 13 Percentage of responses given when prompted 'When are you being impacted?'.

When comparing time of impacts across the distance categories, a higher percentage of respondents within 100 m of a roost listed impacts across multiple time categories (Figure 14).

Most respondents reported impacts during the early and late evening, especially respondents within 100 m of a roost.

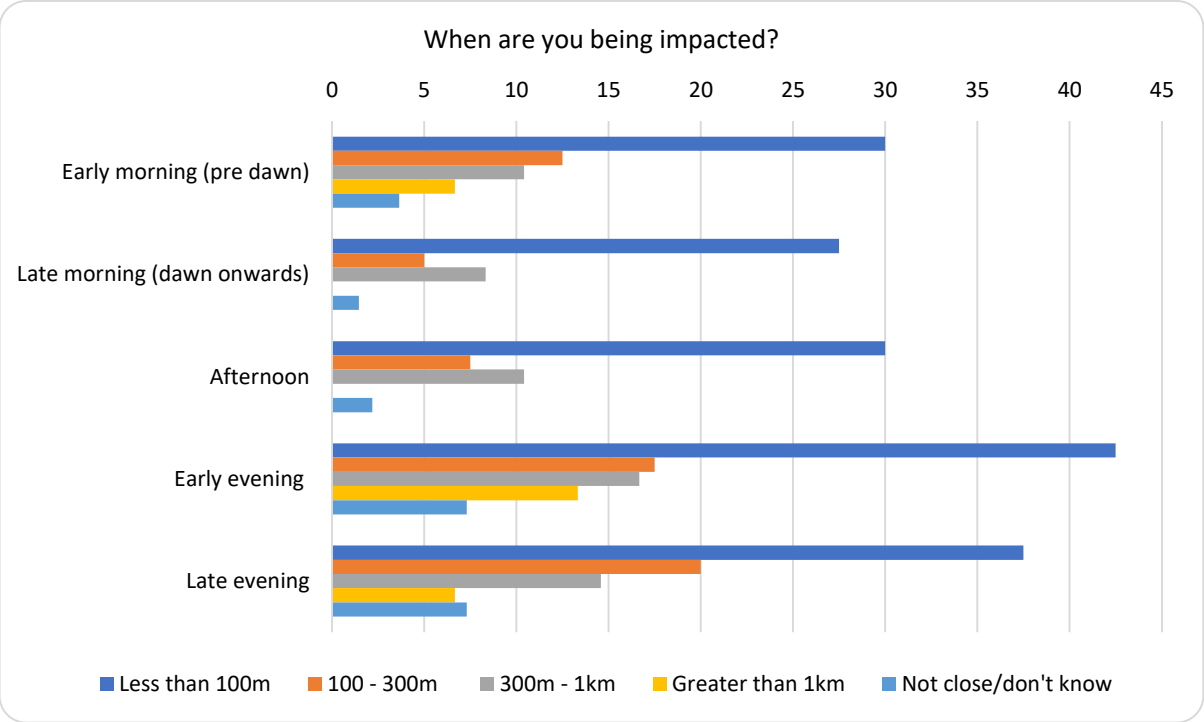


Figure 14 Percentage of responses given when prompted 'When are you being impacted?'. Percentages broken down into distance categories based on the distance of the respondent's home or business from a flying-fox roost.

General understanding about flying-foxes

The majority of respondents were aware that flying-foxes are native animals (90%) protected under legislation (80%) (Figure 15).

The majority of responses (48%) answered correctly that flying-foxes are not increasing in number, 24% believed they are increasing in number, 26% didn't know the answer and 2% did not care (Figure 15). Most respondents were aware that disease can be easily prevented in humans (59%), though 38% believed this to be false or did not know the answer (Figure 15). The majority of respondents were aware that flying-foxes are migratory (58%), with the remainder believing this to be false, or did not know or care (Figure 15). A strong majority of respondents were aware that flying-foxes play an important role in pollination and seed dispersal (84%) (Figure 15).

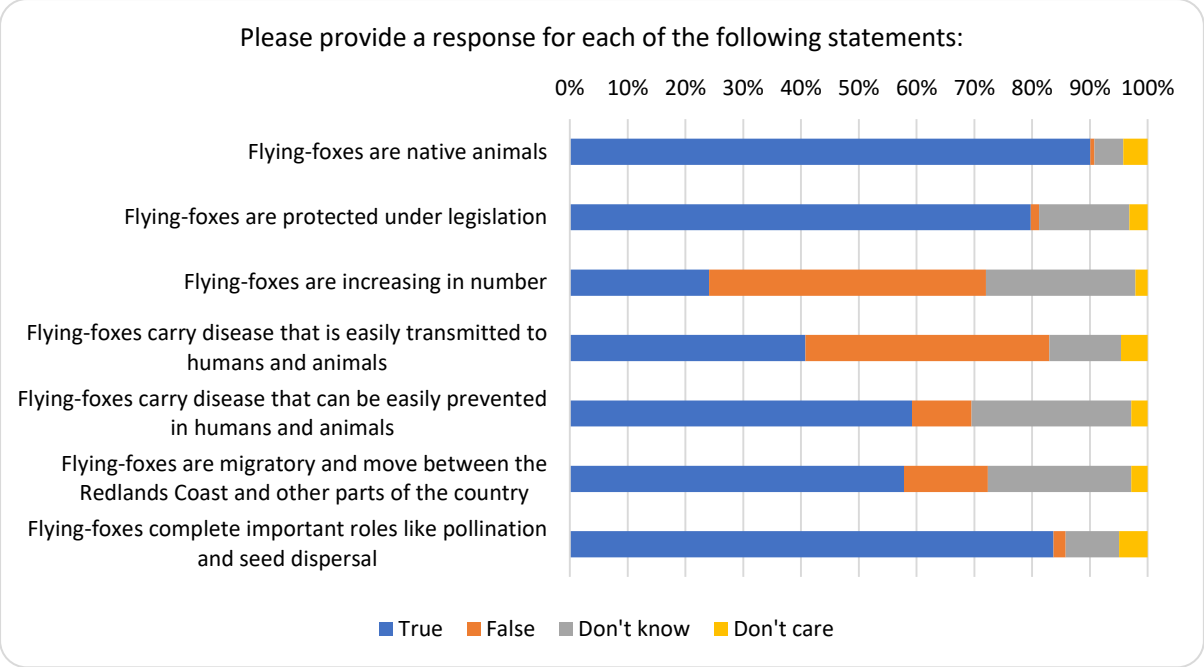


Figure 15 Respondents level of understanding when prompted various true or false statements about flying-foxes. Values are represented as percentages.

The most appealing education option for respondents was to promote flying-foxes as a natural asset for future residents (54%) (Figure 16). The next most popular education option in decreasing order were educational signage (52%), annual flying-fox night (51%), talks by Traditional Owners/wildlife carers (50%), opportunities to meet a flying-fox (44%), school engagement programs (37%), fact sheets (31%) and website links with up to date information (22%) (Figure 16). 16% of respondents did not find any of these education options appealing (Figure 16). Of the 'other' responses listed, 29% of these responses stated 'all of the above' should be used as education options, 19% mentioned that the flying-foxes should be moved on, 14% mentioned that flying-fox numbers should be reduced. The remaining small percentage of other responses included mentions of increasing community education regarding the very low human health risk associated with living close to a flying-fox roost, appropriate town planning and setting up a complaint portal in order for Council to swiftly assess residents' impact and manage these impacts accordingly and transparently.

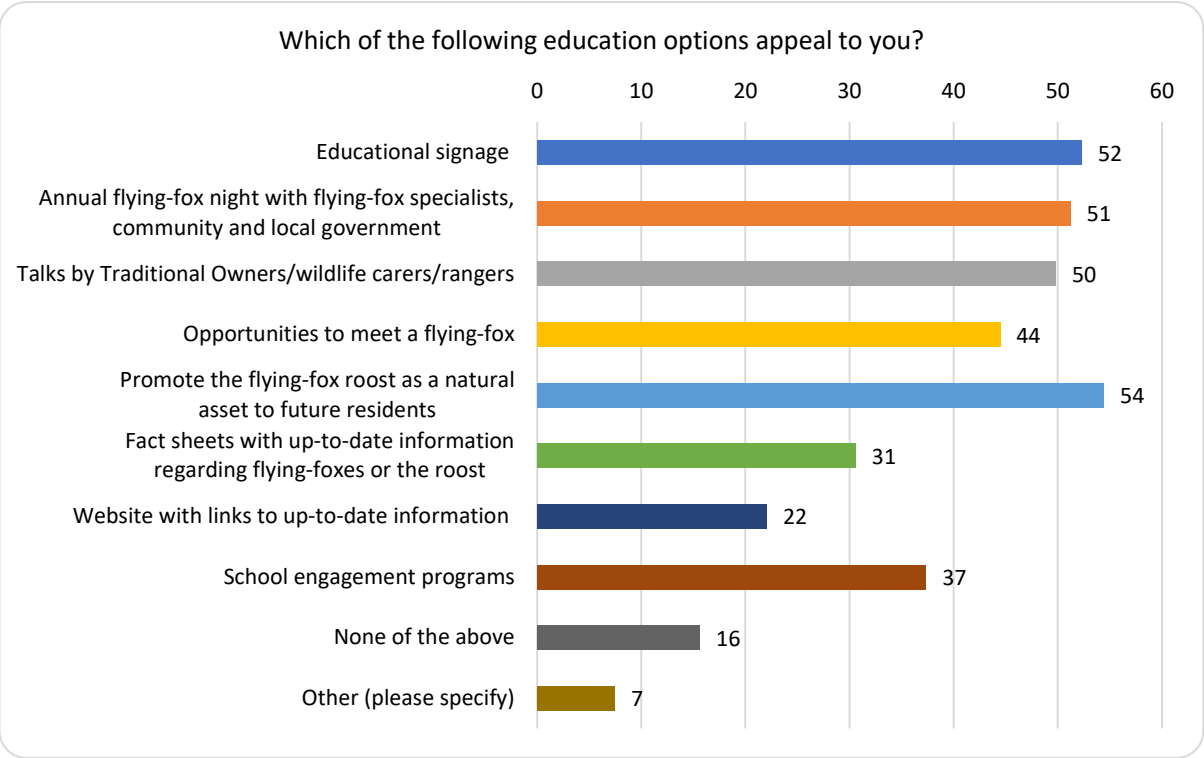


Figure 16 Education options that appealed to responses

Most education options had the lowest support from respondents who live less than 100 m from a flying-fox roost (Figure 17). Generally, the options with the lowest support regardless of distance from a flying-fox roost were fact sheets with up-to-date information regarding flying-foxes or the roost, website with links to up-to-date information and school engagement programs (Figure 17).

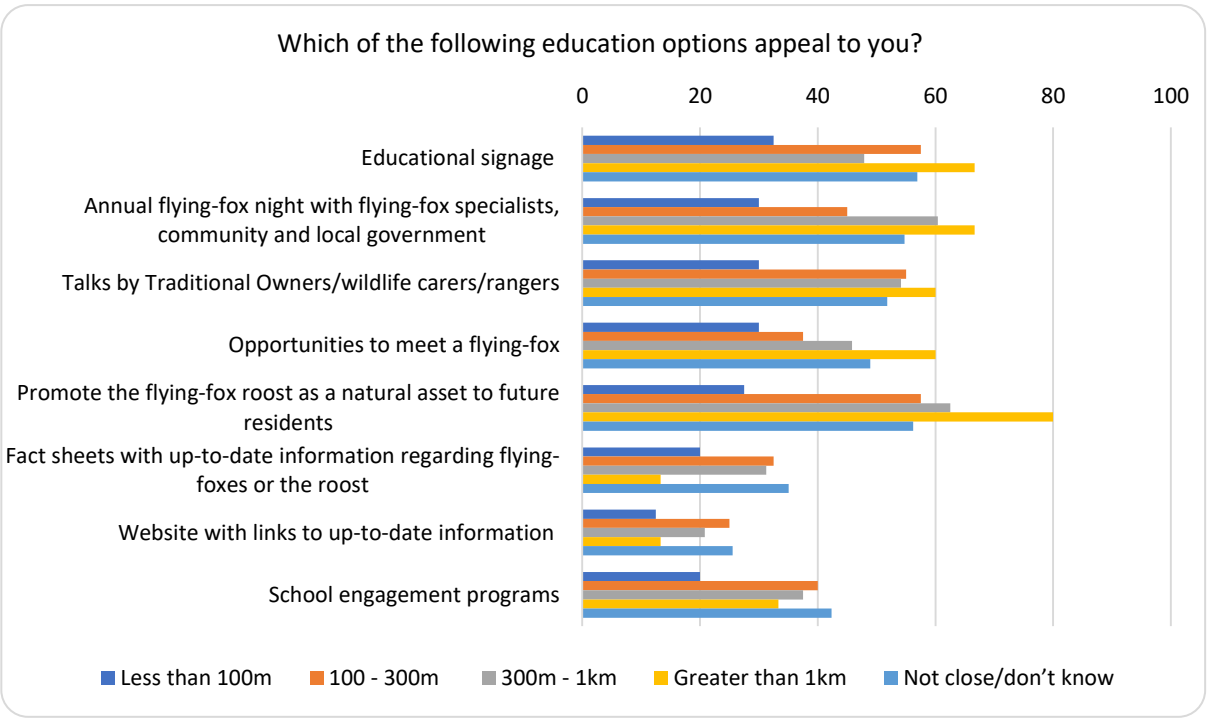


Figure 17 Percentage of responses given when prompted 'Which of the following education options appeal to you?'.

When respondents were asked which actions they felt were appropriate to protect flying-foxes in parklands and bushlands, the majority of respondents (62%) believed that all of the actions given were appropriate (Figure 18). The most popular individual answer given was habitat restoration to provide more native foraging habitat (44%), followed by habitat restoration to protect the roost (43%), monitoring flying fox behaviour (39%), support for wildlife rescuers (37%), with 11% of respondents answered that none of the listed options were appropriate (Figure 18). Of the 'other' responses given, 38% of these comments mentioned that alternative roosting habitats should be maintained to encourage roosting outside of urban areas, 25% of mentioned that flying-foxes should be dispersed from urban areas, with a few other responses mentioning the need to stop developing near/in roosting areas, educated the community on the importance of flying-foxes, removing harmful plants that cause flying-fox paralysis syndrome, and that numbers of flying-foxes should be reduced.

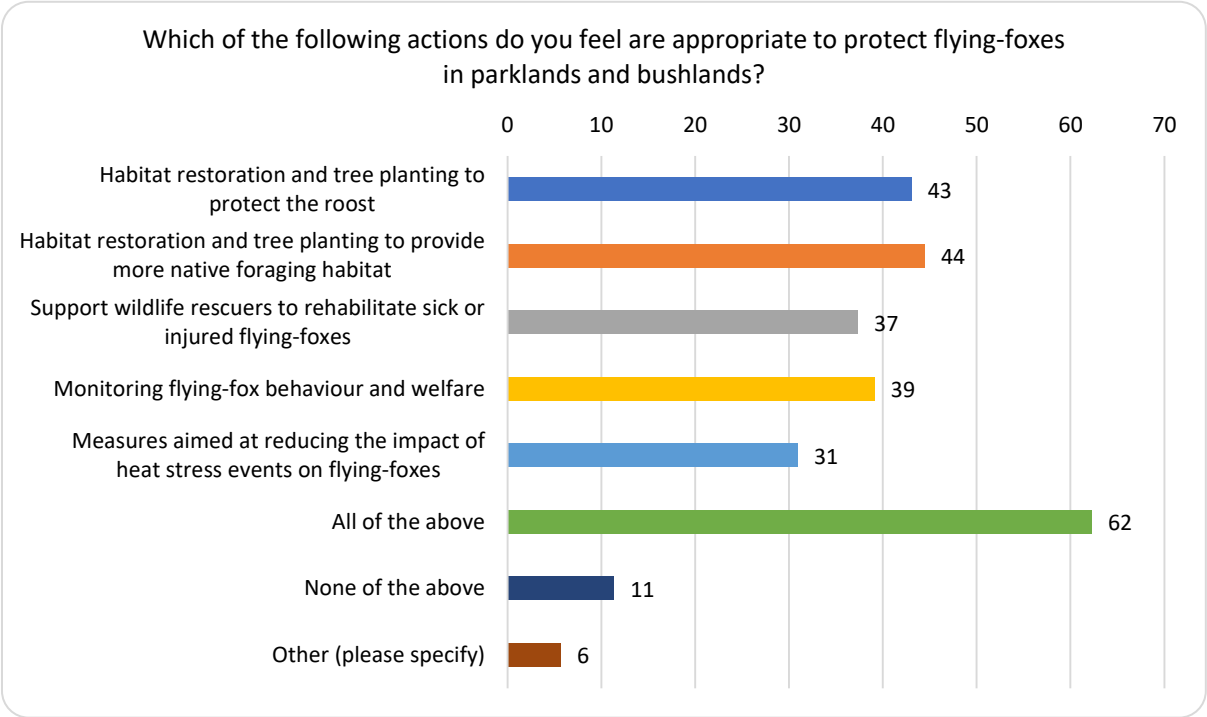


Figure 1810 Percentage of responses given when prompted 'Which of the following education options appeal to you?'.

When comparing the popularity of actions to protect flying-foxes based of the respondents distance from a flying-fox roost, respondants living less than 100 m from a flying-fox roost were much less supportive overall of any of the actions listen to protect flying-foxes in parklands and bushlands (Figure 19). Respondants in the distance categories 100 m – 300 m, 300 m – 1 km and greater than 1 km, generally had similar levels of approval of most actions listed, with the greatest approval of 'all of the above' (Figure 19). Respondants that did not live/own a business close to a flying-fox roost or did not know if they live/own a business close to a flying-fox roost, were much more approving of all actions to protect flying-foxes in parklands and bushlands (Figure 19). Respondants living/owning a business less than 100 m from a flying-fox roost answered 'none of the above' more often compared to all other distance categories (Figure 19).

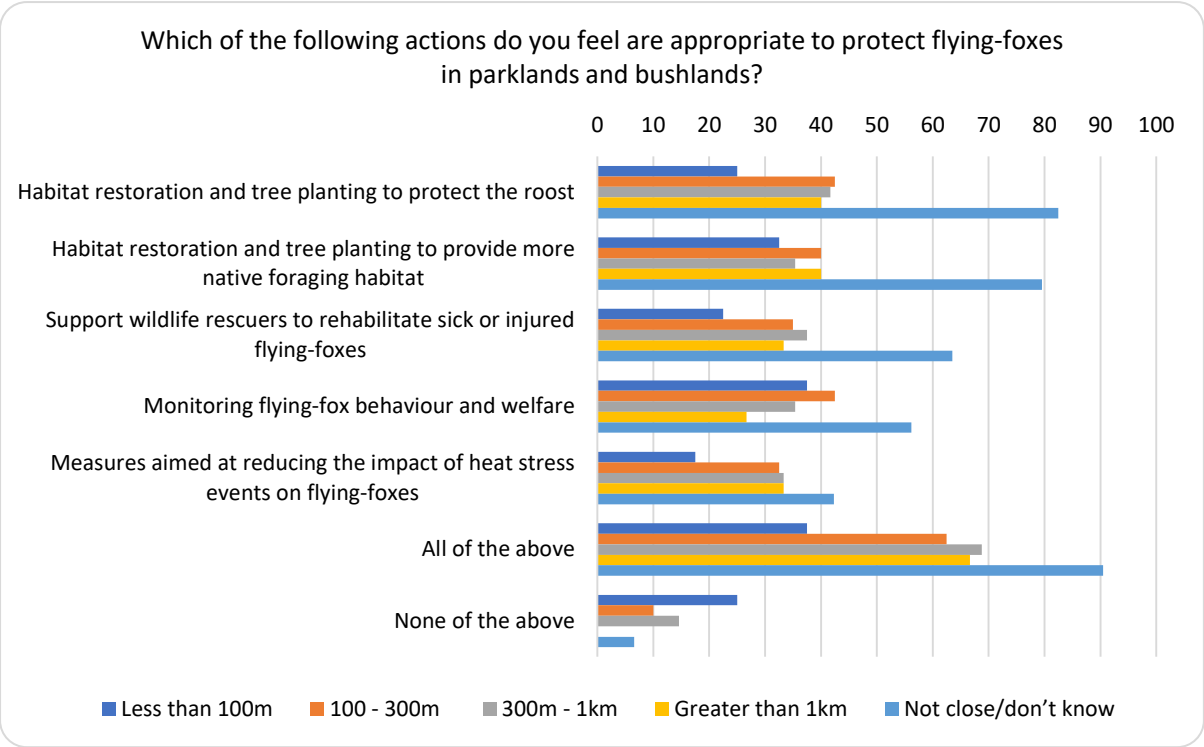


Figure 19 Percentage of responses given when prompted 'Which of the following actions do you feel are appropriate to protect flying-foxes in parklands and bushlands?'. Percentages were broken down into distance categories based on the distance of the respondent's home or business from a flying-fox roost.

Demographics

The majority of respondents identified as female (72%; 22% identified as male, with 6% preferring not to disclose their gender or identifying as non-binary). 45% of respondents were in the 31–50 year age range, 32% were in the 51–70 year age range, 13% were in the 18-30 year age range, 7% were in the >70 age range, with the remaining 3% preferring not to disclose their age. Based on census data from the Australian Bureau of Statistics (2016), the population in Redland LGA is 51% female and 25.4% of people are aged 30-50 years of age, showing that males were underrepresented as were some age groups. 20% of respondents belonged to a resident or environmental group (Table 2).

The top responding areas, comprising 52% of total responses, were 9.3% from both Alexandra Hills and Capalaba, 8.2% from both Victoria Point and Cleveland, 7.1% from Thornlands, and 5% from both Redland Bay and Wellington Point. The remainder of respondents came from other suburbs across Redlands and across Queensland.

Of the 25 respondents who reported their business is affected by a flying-fox roost, 16% of the impacts are in Cleveland, followed by Capalaba, Wellington Point, Alexandra Hills, Victoria Point and Dunwich (all accounting for 8% of impacts on business per suburb).

Table 2 Resident and environmental group participation. 11 respondents answered yes to being part of a group but did not specify.

Birkdale and Thorneside Group
A local bush land care group.
Animal Justice Party, & other Australian animal protection/conservation/environmental groups
Australian Conservation Foundation
Bat Conservation and Rehabilitation
Bat Conservation and Rescue Queensland
Bats and Trees Society of Cairns, Australasian Bat Society, Spectacled Flying-fox Recovery Group. Wildlife Tourism Australia, Ecological Society of Australia, Australasian Wildlife Management Society, Royal Zoological Society and Interpretation Australia
Bats Queensland
Bats Queensland and Wildcare
Bats Queensland, Wildcare Australia, Currumbin Wildlife Hospital
Bay Islands Conservation Inc
BCRQ
Birdlife Qld, Bat Conservation & Rescue, Qld Wildlife Artists Society
Bushcare
FAME
Lamington Natural History Association
LIRA, SMBI Action Group, Island Storytellers, Lamb Island Community Garden
Macleay Island Wildlife and Environment
Moreton Bay
NQ Wildlife Care
Redlands Afterhours Wildlife Ambulance
Redlands Koala Watch
SMBI Coastcare
St James Park Neighbourhood Watch
Wildcare
Wildcare Australia + Landcare.+ Bats Queensland
Wildcare Australia
Wildcare, Bats Queensland
Wildcare, Bats Queensland, gardens for wildlife, scenic rim wildlife
Wildcare/Bats Queensland
Wildlife Queensland
Wildlife Rescue (Straddie)

Appendix 7 Guidelines for working around roosts

Undertaking works within or near a flying-fox roost?

It is the obligation of Redland City Council staff and contractors planning and/or undertaking works around flying-fox roost sites to be aware of their responsibilities under legislation pertaining to flying-foxes and current flying-fox activity.

No works should be undertaken within a flying-fox roost September to January.

Any works undertaken near a flying-fox roost must have a person familiar with flying-fox behaviour as a “flying-fox monitor” to monitor for the duration of the activity.

There are a number of flying-fox roost sites located in Redland City, both on the mainland and North Stradbroke, Coochiemudlo, Russell and Macleay Islands. All currently known flying-fox roosts in the Redlands are mapped and can be viewed on Council’s Red-e-map.

If you are planning on undertaking works within a flying-fox roost, consult with Council’s Wildlife Officers at the initial stages of planning, to ensure you meet our legislative responsibilities.

If you come across a sick, injured or dead flying-fox, do not pick it up, pick up the phone and call Redlands Wildlife Rescue on 3833 4031.

Below is as an activity timetable designed to guide operational works around flying-fox roosts. In some months there is clear direction for operational activity, whereas other months flying-fox behaviour can be variable due to seasonal and climatic influences.

Not all flying-fox roosts are used as mating or maternity roosts. The use of a roost for these purposes is also variable and unpredictable.

Redland City Council Wildlife Officers regularly monitor our flying-fox roosts and are in close liaison with other LGA’s and researchers. It is recommended that the officers be contacted for advice before designing or undertaking any activity near any of our flying-fox roosts.

Activity Guide for Black and Grey-headed Flying-foxes			
Month	Activity	Comments	Conditions
January	Dependent and crèche young		Emergency work only –guidelines apply
February	Mating	Establishment of mating roosts. Males marking and defending mating territories. Some mating activity.	Guidelines apply - check with Wildlife Officers. Not all roosts are used as mating roosts. If it is not a mating roost, work can proceed on advice from Wildlife Officers.
March	Mating	Peak mating activity. Flying–foxes remain in roosts at night.	Guidelines apply – check with Wildlife Officers.
April	Mating	Mating activity may have ceased in some roosts.	Guidelines may apply - check with Wildlife Officers
May	Gestation		Work can proceed on advice from Wildlife Officers
June	Gestation		Work can proceed on advice from Wildlife Officers.
July	Gestation		Work can proceed on advice from Wildlife Officers.
August	Gestation	Caution - Females heavily pregnant.	Work can proceed at night on advice from Wildlife Officers. Guidelines apply.
September	Gestation/Birthing	Some birthing may occur – depending on seasonal influences	Guidelines apply – check with Wildlife Officers. Some work may proceed at night if there is no crèche activity.
October	Birthing and crèche young	Peak birthing Some crèche activity	Guidelines apply – check with Wildlife Officers. Some work may proceed at night if there is no crèche activity.
November	Birthing and crèche young		Emergency work only – guideline apply.
December	Birthing and crèche young		Emergency work only – guidelines apply.

Appendix 8 Dispersal results summary

Roberts and Eby (2013) summarised 17 known flying-fox dispersals between 1990 and 2013, and made the following conclusions:

- In all cases, dispersed animals did not abandon the local area[3].
- In 16 of the 17 cases, dispersals did not reduce the number of flying-foxes in the local area.
- Dispersed animals did not move far (in approx. 63% of cases the animals only moved < 600 metres from the original site, contingent on the distribution of available vegetation). In 85% of cases, new roosts were established nearby.
- In all cases, it was not possible to predict where replacement roosts would form.
- Conflict was often not resolved. In 71% of cases, conflict was still being reported either at the original site or within the local area years after the initial dispersal actions.
- Repeat dispersal actions were generally required (all cases except where extensive vegetation removal occurred).
- The financial costs of all dispersal attempts were high, ranging from tens of thousands of dollars for vegetation removal to hundreds of thousands for active dispersals (e.g. using noise, smoke, etc.).

Ecosure, in collaboration with a Griffith University Industry Affiliates Program student, researched outcomes of management in Queensland between November 2013 and November 2014 (the first year since the current Queensland state flying-fox management framework was adopted on 29 November 2013).

An overview of findings[4] is summarised below.

- Dispersal methods included fog[5], birdfrite, lights, noise, physical deterrents, smoke, extensive vegetation modification, water (including cannons), paintball guns and helicopters.

[3] Local area is defined as the area within a 20-kilometre radius of the original site = typical feeding area of a flying-fox.
[4] This was based on responses to questionnaires sent to councils; some did not respond and some omitted responses to some questions.
[5] Fog refers to artificial smoke or vapours generated by smoke/fog machines. Many chemical substances used to generate smoke/fog in these machines are considered toxic.

- The most common dispersal methods were extensive vegetation modification alone and extensive vegetation modification combined with other methods.
- In nine of the 24 roosts dispersed, dispersal actions did not reduce the number of flying-foxes in the LGA.
- In all cases, it was not possible to predict where new roosts would form.
- When flying-foxes were dispersed, they did not move further than six kilometres away.
- As at November 2014 repeat actions had already been required in 18 cases.
- Conflict for the council and community was resolved in 60% of cases, but with many councils stating they feel this resolution is only temporary.
- The financial costs of all dispersal attempts were considerable, regardless of methods used, ranging from $7500 to more than $400,000 (with costs ongoing).

Appendix 9 Roost occupancy categories

The following categories are adapted from the *Interim policy for determining when a flying-fox congregation is regarded as a flying-fox roost under section 88c of the NC Act* (DES 2021).

Occupancy category	Definition
Continuous	Permanently, or almost permanently, occupied.
Seasonal	Occupied during certain periods as a result of availability of nearby food sources or due to climatic changes such as seasonal temperature variations.
Pop-up	Site used sporadically for short periods.
New	Site where flying-foxes have not been known to congregate previously, or where occupation has not yet met the criterion 'from time to time'. Includes splinter roosts.
Historical	Not occupied for five consecutive years.

Appendix 10 Potential roost habitat modelling – methods

Background

The key objective of this task was to identify and map potential flying-fox habitat across Redland City LGA to produce an LGA-wide digital map of existing and likely flying fox roost habitat.

Habitat attributes previously identified by Ecosure (2018) as likely to influence flying-fox roost selection still formed the basis of the current model. However, the most significant change to the potential roost habitat model from the 2018 version was the additional utilisation of the Queensland Herbarium flying-fox nectar mapping layer, a spatial dataset showing the distribution and temporal dynamics of vegetation that provide foraging resources for little red flying-foxes (LRFF) in Queensland. The previous 2018 model had only considered mapping of grey-headed flying-fox (GHFF) foraging habitat (Eby and Law 2008) as a proxy for all other flying-fox species. The inclusion of little red flying-fox foraging habitat quality as a separate variable to the model allows for the individual scoring and, if required, weighting of each species foraging habitat based on its quality.

Scoring thresholds for model parameters were evaluated and adjusted to calibrate the model for local flying-fox preferences within the Redland City region. This was achieved by intersecting mapped areas of existing roosts with each of the model input layers to quantify preferences within each feature type.

The final model framework used for mapping potential flying-fox roost habitat is provided in Table 1.

Table 1 Scoring values for habitat attributes (grey fill denotes scores are weighted)

Score	Proximity to water	Woody vegetation (use SLATS 2019 extent)	Suitable roost habitat mask (based on RE's)	Preferred vegetation (based on current roosts) using RE	Height (m)[1]	Mid-storey structure	Nightly commute (score / 2)				Nectar (score / 2)				Distance to urban area	Slope
							Rank 1	Rank 2	Rank 3	Rank 4	High >=16	Med (7-15)	Low (1-6)	0		
0	>500 m	Conditional mask Y/N	Conditional mask Y/N	All other RE's	no canopy <3m and >23m	No mid-storey, '0' or null?	>20 km	>20 km	>20 km	>10 km	>20 km	>20 km	>20 km	>10 km	>5 km	>15° incline
1	400 – 500 m			12.3.11 when mixed with 12.3.6; 12.3.5; 12.3.7 or 12.2.7		1-5% likelihood	-	-	10- 20 km	<10 km	-	-	10- 20 km	<10 km	1-5 km	10-15° incline
2	300 – 400 m			12.1.3 & 12.1.1		5-10% likelihood	-	10- 20 km	<10 km	-	-	10- 20 km	<10 km	-	100 m - 1 km	5-10° incline
3	200 – 300 m			Score 4 - 12.5.2; 12.2.5; 12.5.3; 12.9-10.4; 12.2.6; RE1 is 12.2.14 or 12.2.15 occurring with RE2 12.3.5, 12.3.6, 12.3.7 or 12.2.7	3-8 m and 19-23m	>15%	10- 20 km	<10 km	-	-	10- 20 km	<10 km	-	-	50 – 100 m (score 4)	3 to 5° incline
4	< 200 m			Score 8 - 12.3.6; 12.3.5; 12.3.7 or 12.2.7	9-18 m	10-15%	<10 km	-	-	-	<10 km	-	-	-	<=50m i.e. Within urban area (score 8)	0 to 3° incline

[1] Based on comparison between field collected and spatial data in Timmiss (2017) and the data range that remote sensing data is returning greater height values than field collected data.

Data acquisition and review

Both local, regional and state-wide datasets were sourced and reviewed for suitability in terms of spatial resolution, consistency, extent, age and reliability. A complete list of data used for modelling and mapping potential flying-fox roost habitat are listed in Table 2.

Table 2 Data used for modelling potential flying-fox roost habitat

Dataset name	Description	Source	Temporal relevance	Spatial resolution
Remnant vegetation cover - 2019 - Queensland (version 12.1)	Delineation of remnant/non-remnant vegetation, cleared areas and other features for Queensland. Based on the 2019 remnant regional ecosystem mapping.	Qspatial 2022	2019	1:100,000
State-wide Landcover And Trees Study (SLATS) Sentinel-2 - 2019 woody vegetation extent	The SLATS 2019 Woody extent dataset shows the presence/absence of woody vegetation throughout Queensland.	Qspatial 2022	2019	1:10,000
Digital Elevation Model (DEM) of Australia derived from LiDAR 5 Metre Grid	LiDAR-derived 5m DEM representing bare earth elevation above sea level	Geoscience 2022	2015	5 m x 5 m
Vegetation height	Vegetation height and structure - derived from ALOS-1 PALSAR, Landsat and ICESat/GLAS, Australia coverage	TERN 2022	2009	30 m x 30 m
Vegetation structure - midstorey cover	Vegetation height and structure - derived from ALOS-1 PALSAR, Landsat and ICESat/GLAS, Australia coverage	TERN 2022	2009	30 m x 30 m
Regional land use categories - South East Queensland	Regional land use categories - South East Queensland Regional Plan 2009-2031	Qspatial 2022	2009-2031	1:10,000
Redland City LGA boundary	Extracted from the Local government area boundaries - Queensland dataset	Qspatial 2022	2022	1:10,000
Flying_Fox_Nectar_map_V_2_0	Map showing the distribution and temporal dynamics of vegetation that provide foraging resources for little red flying-foxes (*Pteropus scapulatus*) in Queensland.	Queensland Herbarium 2020	2019	1:100,000
Grey-headed flying-fox foraging habitat SEQ	Map showing the distribution and temporal dynamics of vegetation that provide foraging resources for grey-headed flying-fox (*Pteropus poliocephalus*)	Eby and Law 2008	2007	1:100,000
Current Land	Land parcels accepted as current in Council's property system, with boundaries as defined from the Qld Digital Cadastral Database, or survey plans received by RCC. (Source CUL_BND_OWN_CURRENTLAND_P).	RCC 2022	2022	1:10,000

Dataset name	Description	Source	Temporal relevance	Spatial resolution
Waterbodies	Polygon feature layer delineating waterbodies and are classified as either major or minor waterways or natural drainage lines – these can be classified as natural or artificial basins or stream dams or tidal	RCC 2022	2022	1:10,000
Reaches	Line feature layer delineating reaches classified as either major or minor waterways, natural or artificial (open or closed) drainage	RCC 2022	2022	1:10,000
Queensland Wetland Data Version 5.0 - Wetland lines	This dataset provides mapping of water bodies and wetland regional ecosystems at 1:100,000 scale across Queensland, except for areas along the east coast which are mapped at the 1:50 000 scale	Qspatial 2022	2017	1:50,000

Data preparation

Data were prepared and processed using ESRI ArcMap 10.8.1 with the Spatial Analyst extension. The analysis extent of the model covered the whole of Redland City council area with an additional 20 km buffer around the LGA to account for foraging commutes outside of the LGA. Using a raster grid overlay analysis approach, the model was run at a spatial resolution of 5 m x 5 m. Once dataset quality checks were complete, all data layers were projected to GDA_1994_MGA_Zone_56 and resampled to the required 5 m x 5 m cell size. A complete list of all model variables used for mapping potential flying-fox roost habitat are summarised in Table 3.

Table 3 Summary of model variables used for mapping potential roost habitat

Feature	Implications for site selection
Vegetation type	Sites dominated by favoured vegetation species
Roost tree height	Vegetation communities containing trees greater than 4 m selected
Mid-storey structure	Presence of emergent trees and mid-storey used to indicate suitable structure
Proximity to foraging habitat	Sites closest to high value resources (i.e. within 20 km of the top 1 or 2 ranks, as mapped by Eby and Law 2008 for grey-headed flying-foxes; and within 20 km of highest scored vegetation as mapped by Eyre et al. 2020 for little red flying foxes) being most highly scored
Alternative food resources	Proximity to supplementary resources (such as botanic gardens, residential and street trees, etc.) included using proximity to urban areas as a proxy
Distance to urban areas	Proximity to urban areas, with sites closest being more highly scored
Distance to water	Sites within 500 m of watercourses are preferred, with those within 200 m having higher priority

Feature	Implications for site selection
Slope	Flat sites preferred (or any slope within 100 m of waterway

Identification of preferred vegetation

Presence of suitable roost habitat (woody vegetation mask)

Given that flying-foxes have been shown to prefer vegetation within transformed urban landscapes (Timmiss 2017), when modelling for potential flying-fox roost habitat it is important to somehow include suitable non-native vegetation as well as native vegetation within these areas. However, none of the national, state-wide or regional vegetation mapping layers included small and/or regrowth vegetation patches (native or non-native) within urban areas. As a means to include all such vegetation in the scored evaluation model, the Sentinel 2-derived State-wide Landcover And Trees Study (SLATS) 2019 woody vegetation extent, a layer showing the presence/absence of woody vegetation throughout Queensland, was used. A mask of 'suitable roost vegetation' was created using a combination of the SLATS 2019 woody vegetation and mapped regional ecosystem (RE's) within the 2019 Remnant vegetation cover of Queensland (version 12.1) identified as being 'preferred habitat' (Table 4).

Height of vegetation

While Roberts (2005) reported flying-foxes selectively roost in vegetation greater than 5 m in height (Roberts 2005), more recent research by Lunn et al. (2021) observed the following segregation of species by roosting height: black flying-foxes typically showed the highest roosting heights (average maximum height with interquartile range: 18.0, 14.6–21.0; average minimum height with interquartile range: 14.3, 11.3–17.2), followed by grey-headed (maximum: 15.1, 11.2–18.9; minimum: 12.6, 8.8–16.2), followed finally by little red flying-foxes (when present) (maximum: 11.4, 9.2–13.6; minimum: 8.8, 7.1–10.4). It was noted, however, within-roost site topographical variation was not considered in the reported height measurements, meaning that the heights differences reported reflect a relative height difference in roosting heights from the ground within trees, and may not reflect true, realized height relative to the canopy. Further to this, local observations of flying-foxes at Junee Wetlands reveal LRFF utilising canopy below 3.2m (J. Bracks, pers. comm., March 2022). Based on these latter observations, vegetation height was scored based on a 3 m cut-off.

The AusCover vertical plant profiles for the Australian continent which include height was used to incorporate vegetation height as a separate variable within the potential habitat model (TERN 2022). To establish meaningful score thresholds for vegetation height classes in the model, the frequency distribution curve of vegetation heights occurring within existing roosts was examined, making it possible to empirically identify local height preferences within the Redland City region (Figure 1). Based on these outputs, vegetation with a height below 3 m and above 23 m was scored '0', while vegetation 3 to 8 m and 19 to 23 m was scored '3' and vegetation heights within the range of 9 m to 18 m were scored highest with a score of '4'.

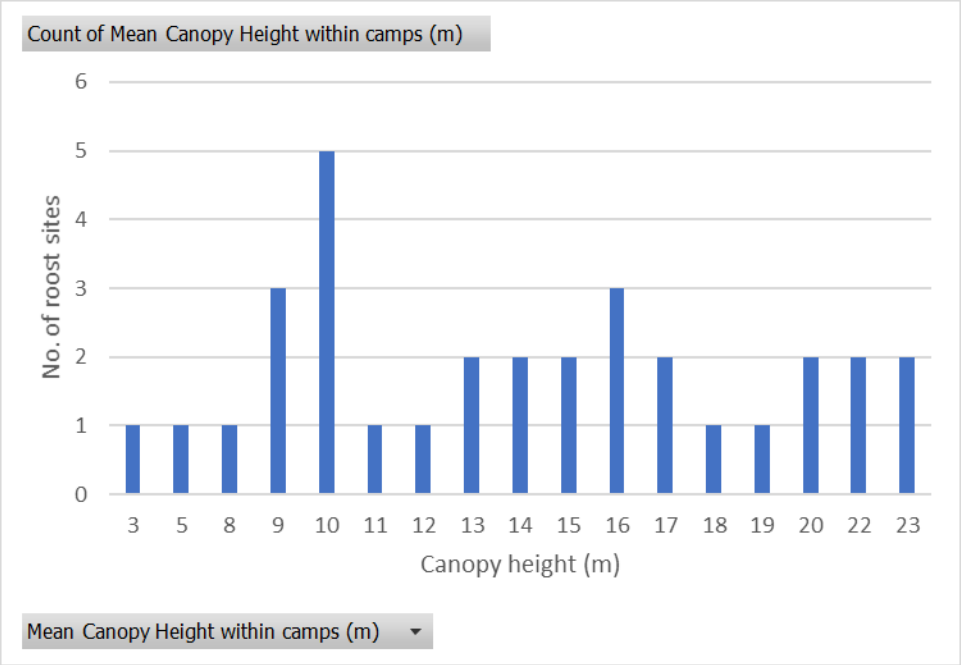


Figure 1 Frequency distribution curve of vegetation heights occurring within existing Redland City flying-fox roosts

Fractional cover of mid-storey

Flying-foxes appear to select sites based on mid-storey cover as opposed to overall canopy cover (Timmiss 2017; Pallin 2000). Therefore, the AusCover vegetation structure mapping was used to evaluate vegetation preference based on fraction of mid-storey plant cover between 5 m and 10 m. To identify relationships between roost selection and mid-storey plant cover, data were extracted from the mid-storey dataset at the buffered locations of known roosts. Examination of the data revealed that sites with mid-storey plant cover fractions of 10 to 15% were more frequently selected than any other level of plant cover at 5 m to 10 m (Figure 2).

Based on these results, mid-storey structure was scored as follows: 0-1% (score = 0); 1-5% (score = 1); 5-10% (score = 2); >15% (score = 3); and 10-15% (score = 4).

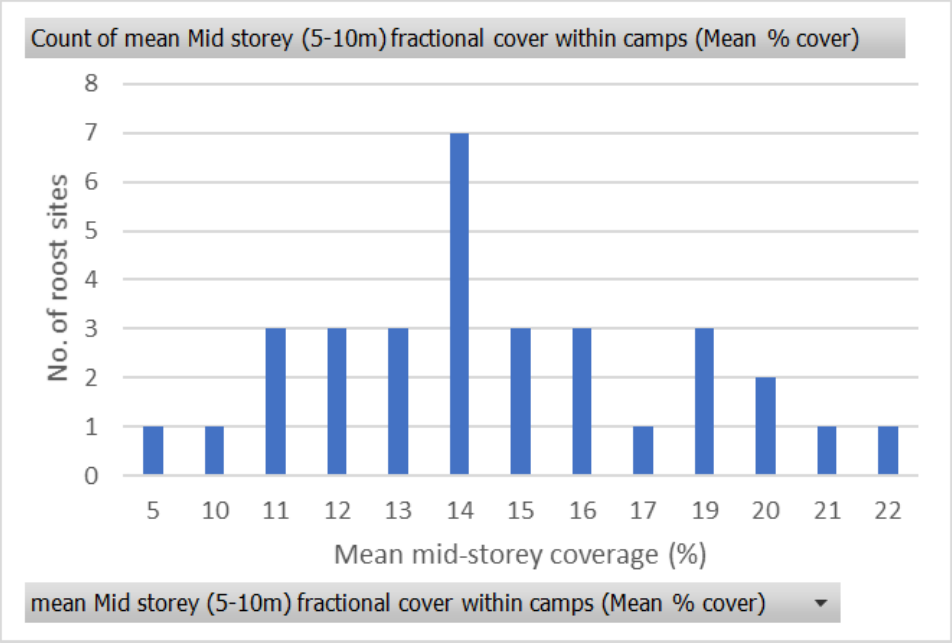


Figure 2 Frequency distribution of fraction of mid-storey plant cover at existing flying-fox roosts.

Preferred vegetation

To focus the analysis to only those vegetation communities likely to be selected by flying-foxes as potential roosting purposes, RE's within the 2019 State regional ecosystem mapping (v. 12.1) were reviewed and selected for scoring in the habitat model based on characteristics used as selective preference by flying-foxes, such as complexity of structure, likely presence of mid-storey, density, etc. RE communities which were deemed as unlikely flying-fox habitat were masked out of the analysis. Table 4 lists all RE communities occurring within Redland City LGA and denotes each RE as likely ('yes') or unlikely ('no') flying-fox roost habitat.

Furthermore, to take into account actual selection of specific vegetation types by flying-foxes, a second scoring system was applied to vegetation classes based on their frequency of occurrence at known roosts within the Redland City region. Through an analysis of vegetation communities occurring at 32 known roost locations, vegetation preference was evaluated and scored based on the resultant statistics, which showed that the large majority of existing flying-fox roosts (78% or 25 out of 32 of roosts) within the Redland City area contained some level of melaleuca dominated RE community (i.e. 12.3.5, 12.3.6, 12.3.7 and/or 12.2.7). The next most frequently occurring communities within roosts were RE's with a mixture of *Corymbia intermedia* and species such as *Eucalyptus tereticornis* (i.e. 12.5.2; 12.2.5); RE communities with *Eucalyptus racemosa* dominating (i.e. 12.5.3; 12.9-10.4; 12.2.6); as well as foredune complex and Gahnia communities with subdominant presence of melaleuca (i.e. RE1 is 12.2.14 or 12.2.15 occurring with RE2 12.3.5, 12.3.6 , 12.3.7 or 12.2.7) (occurring in 10, 9, 3 out of 32 roosts, respectively). The third most frequently occurring RE's were Mangrove RE (i.e. 12.1.3) & Casaurina RE (1/32) (i.e. 12.1.1) (occurring at 4 & 1 out of 32 roosts, respectively). The RE *Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia* open forest on alluvial plains usually near coast (i.e. 12.3.11) was also considered in scoring. Based on this demonstrated preference for specific vegetation types, the scores

of preferred vegetation classes were weighted to reflect this preference for certain vegetation types by flying-foxes in the model.

Thus, the most frequently selected vegetation classes (i.e. the predominantly melaleuca-based communities) scored '8', the second most frequently selected classes scored '4', third were Casaurina and Mangrove communities scoring '2', second *E. tereticornis/Corymbia intermedia* mixed communities scoring '1' and all other RE's scored '0'. Vegetation classes identified as being not preferred by flying-foxes were not included in this analysis i.e. were masked out. Similarly, areas devoid of vegetation that were also classified as 'cleared' were excluded by masking with the woody vegetation layer.

Table 4 Classification of regional ecosystem communities occurring within the Redland City LGA into potential flying-fox habitat

Regional ecosystem	Likely flying-fox habitat?
12.1.1	Yes
12.1.1/12.1.3	Yes
12.1.1/12.3.6	Yes
12.1.2	No
12.1.2/12.1.1	No
12.1.2/12.1.3	No
12.1.3	Yes
12.1.3/12.1.1	Yes
12.1.3/12.1.2	Yes
12.1.3/12.2.14	Yes
12.1.3b	Yes
12.1.3e	Yes
12.1.3f	Yes
12.11.10	Yes
12.11.23	Yes
12.11.23/12.11.24/12.11.25	Yes
12.11.23/12.11.27	Yes
12.11.24	Yes
12.11.24/12.11.23/12.11.25	Yes
12.11.24/12.11.25	Yes
12.11.25	Yes
12.11.25/12.11.24	Yes
12.11.26	Yes
12.11.27	Yes
12.11.27/12.11.23	Yes
12.11.27/12.11.23/12.11.26	Yes

12.11.27/12.11.24	Yes
12.11.27/12.11.26	Yes
12.11.3	Yes
12.11.3/12.11.24	Yes
12.11.3a	Yes
12.11.3a/12.11.10	Yes
12.11.5	Yes
12.12.14	Yes
12.12.19	No
12.12.19x5	No
12.2.1	Yes
12.2.10	Yes
12.2.10/12.2.13	Yes
12.2.12	Yes
12.2.13	No
12.2.13/12.2.10	No
12.2.14	Yes
12.2.14/12.2.7	Yes
12.2.15	Yes
12.2.15a	Yes
12.2.15f	Yes
12.2.16	No
12.2.2	Yes
12.2.5	Yes
12.2.6	Yes
12.2.7	Yes
12.2.7/12.2.15	Yes
12.2.7a	Yes
12.2.8	Yes
12.2.9	No
12.2.9/12.2.10	No
12.2.9/12.2.13	No
12.3.11	Yes
12.3.11/12.3.6	Yes
12.3.11a	Yes
12.3.13	Yes
12.3.16	Yes
12.3.20	Yes

12.3.5	Yes
12.3.5/12.3.13	Yes
12.3.5/12.3.6	Yes
12.3.6	Yes
12.3.6/12.1.1	Yes
12.3.6/12.3.11	Yes
12.3.6/12.3.16	Yes
12.3.6/12.3.5	Yes
12.3.7	Yes
12.3.8	Yes
12.5.2a	Yes
12.5.2a/12.1.1	Yes
12.5.2a/12.3.5	Yes
12.5.2a/12.5.3	Yes
12.5.2a/12.5.3/12.3.6	Yes
12.5.3	Yes
12.5.3/12.3.5	Yes
12.5.3/12.5.2a	Yes
12.5.6c	Yes
12.5.9	No
12.9-10.17c	Yes
12.9-10.17d	Yes
12.9-10.19a	Yes
12.9-10.4	Yes
canal	No
estuary	No
non-rem	Yes
ocean	No
plantation	Yes
sand	No
water	No

Proximity to water

Proximity to water is a key attribute in roost location (Hall and Richards 2000) with one study suggesting that 94% of Grey headed flying-fox roosts in NSW were (at that time) located adjacent to or on a waterway or waterbody (Eby 2002). Roberts (2005) reported that all 40 roosts were located within 200 m of a drainage line. Peacock (2004) found that all of the 44 sites surveyed were located within 600 m of a watercourse, however many of these were dry

at the time of survey. This suggests that the watercourse, and possibly broader topographical features, may act as navigational aids for flying-foxes (Roberts 2005, Hall and Richards 1991). To account for this, perennial waterways and other water bodies (e.g. lakes and dams) were identified using the state-wide hydrological surface and hydrological area layers. Distances to these water sources were scored as follows: <200m (score = 4); 200-300 m (score = 3); 300 m-400m (score = 2); 400-500m (score = 1); and > 500m (score = 0).

Distance to urban area

A number of studies have shown an increasing tendency for flying-foxes to roost in urban areas (Eby and Lunney 2002, Williams et al. 2006, van der Ree 2006). More recently, Timmiss (2017) showed that nearly three quarters of Grey-headed, Black and Little-red flying-fox (GHFF, BFF, LRFF) roosts across Australia are in urban areas (72%, 73% and 69% respectively). However, it has been suggested that while GHFF are roosting in urban areas, they still prefer to feed in non-urban areas (Roberts 2013).

Based on these results, the scoring of distance to urban areas is as follows: ≤50 m (score = 8); 50-100 m (score = 4); 100 m-1 km (score = 2); 1-5 km (score = 1); and >5 km (score = 0).

Urban centres were defined using selected QPP description classes of the RCC zoning layer (Table 5).

Table 5 QPP Description classes used to define urban centres

QPP Description
District Centre
Local Centre
Low Impact Industry
Major Centre
Mixed Use
Principal Centre
Specialised Centre
Character Residential
Emerging Communities
Low-medium Density Residential
Low Density Residential
Medium Density Residential
Neighbourhood Centre
Tourist Accommodation

Nightly commute

While nightly commuting distances by flying-foxes is determined by the availability of sufficient food resources and can be up to 50 km (Eby 1996, Parry-Jones and Augee 1991 and 2001), telemetry results have shown that flying-foxes typically tend not to travel further than 20 km (Roberts 2012; pers. comm. B. Roberts August 2018). Two separate spatial datasets were used to include the individual foraging preferences of GHFF and LRFF (as described below). Scoring for proximity to foraging habitat for each layer was divided by 2 to prevent double counting the importance of foraging habitat quality in the model (see Table 1 for scoring).

Grey-headed and Black flying-fox: GHFF and BFF foraging preferences were incorporated into the model using a mapping layer produced by Eby and Law (2008) which ranks and maps vegetation species that provide nectar and pollen as well as fruit resources on a regional scale. Using the habitat productivity ranking it was possible to include commuting distances based on forage habitat quality. Although the Eby and Law (2008) mapping exercise related only to GHFF, the data were used as a basis for modelling BFF too as the diets of the two species overlap and they are also known to co-roost.

Little red flying-fox: LRFF foraging preferences were incorporated into the model using the Queensland Herbarium's Flying_Fox_Nectar_map_V_2_0 mapping which shows the distribution and temporal dynamics of vegetation that provide foraging resources for little red flying-foxes (*Pteropus scapulatus*) in Queensland (Eyre et al. 2020). Quality of foraging habitat was ranked as follows by Eyre et al. 2020) as follows: low = 0-6, medium = 7-15, high = 16-33.

Slope

Landscape features identified as being 'typical' of roost sites include a level site or one with less than 5˚ incline (Eby 2002; Peacock 2004; Roberts 2005) or gullies (Roberts 2005). However, while flying-foxes seem to prefer flat topography, they will utilise suitably vegetated gullies along water courses. Slope was scored as follows: 0-3 degree incline (score = 4); 3 to 5 degree incline (score = 3); 5-10 degree incline (score = 2); 10-15 degree incline (score = 1); and >15 degree incline (score = 0).

Determination of potential roost habitat

Once the attributes within each input dataset had been processed and scored (as per Table 1), the ESRI Spatial Analyst raster calculator was used to sum up the scores across each input layer. The resultant raster data output produced a spatially distributed range of values representing levels of potential for roost habitat. Score thresholds determining classes of medium and high potential habitat were ascertained by extracting the maximum and minimum summed model score values at roost locations. The minimum value of the minimum value scores was used to determine the lowest cut-off for low habitat potential. Thresholds between low, medium and high habitat potential were determined using natural breaks in the distribution of score outputs within existing roosts.

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	21/03/2022	Redlands Coast Flying-fox Plan DRAFT R0	Jess Bracks, Principal Wildlife Biologist Ellie Kirke, Wildlife Biologist Kaye Currey, Senior Wildlife Biologist Tegan Dinsdale, Graduate Wildlife Biologist GIS modelling – Dr Rebecca Sims Castley	Jess Bracks, Principal Wildlife Biologist Kaye Currey, Senior Wildlife Biologist	Jess Bracks, Principal Wildlife Biologist
01	06/04/2022	Redlands Coast Flying-fox Plan DRAFT R1		Jess Bracks, Principal Wildlife Biologist (incorporating initial Council comments)	
02	16/05/2022	Redlands Coast Flying-fox Management Plan DRAFT		Jess Bracks, Principal Wildlife Biologist (incorporating Council comments)	

Distribution List

Copy #	Date	Type	Issued to	Name
1	16/05/2022	Electronic	Redland City Council	Candy Daunt, Jenny Davis, Lisa Bailey
2	16/05/2022	Electronic	Ecosure	Administration

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