Australian Capital Territory

Nature Conservation (Draft Native Species Conservation Plan for the Grey-headed Flying-fox) Public Consultation Notice 2024

Notifiable instrument NI2024–303

made under the

Nature Conservation Act 2014, s 120 (Draft native species conservation plan—public consultation)

1 Name of instrument

This instrument is the *Nature Conservation (Draft Native Species Conservation Plan for the Grey-headed Flying-fox) Public Consultation Notice 2024.*

2 Commencement

This instrument commences on the day after its notification day.

3 Draft native species conservation plan

I have prepared the draft native species conservation plan for the Grey-headed Flying-fox set out in schedule 1 (the ***draft native species conservation plan***).

4 Public consultation period

(1) Anyone may give a written submission about the draft native species conservation plan to:

Conservator of Flora and Fauna
Environment, Planning and Sustainable Development Directorate
GPO Box 158, CANBERRA ACT 2601
Via email: officeofnatureconservation@act.gov.au

(2) Submissions may only be given during the public consultation period. The public consultation period begins on the day this notice is notified and ends on 29 July 2024.

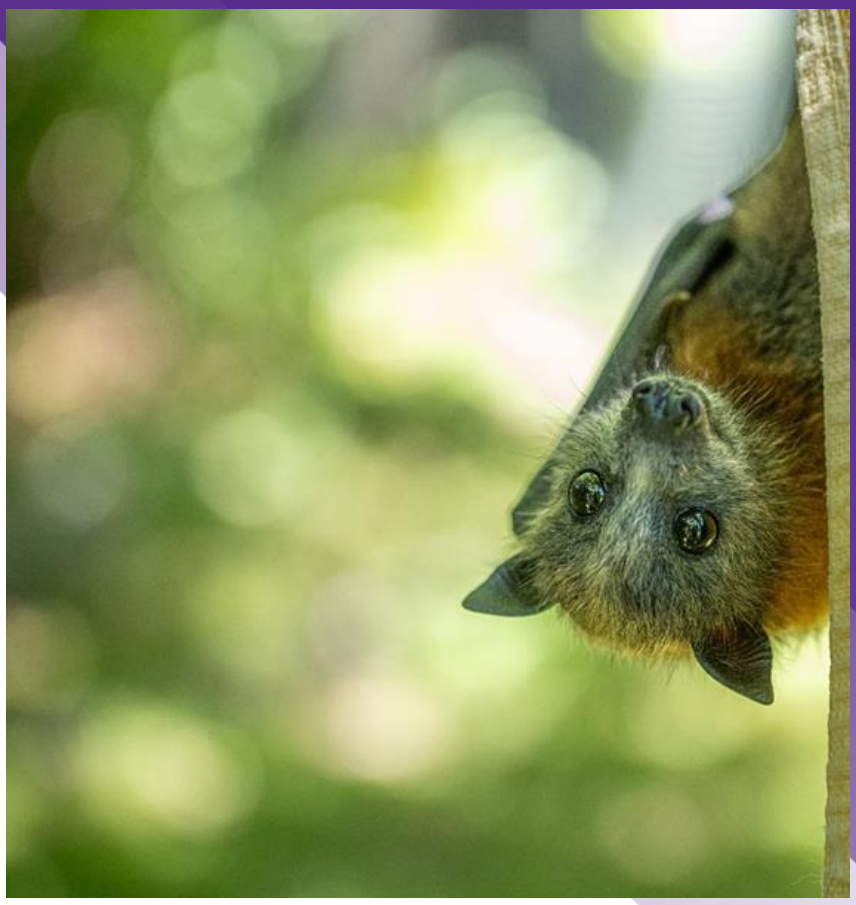
Bren Burkevics
Conservator of Flora and Fauna
17 June 2024

SCHEDULE 1

ACT Government

Draft Native Species Conservation Plan

Grey-headed Flying-fox *Pteropus poliocephalus*



Environment Planning and Sustainable Development

The ACT Government acknowledges the Ngunnawal people as traditional custodians of the ACT and recognises any other people or families with connection to the lands of the ACT and region. We acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region

Telephone: 02 6207 1923 **Website:** www.planning.act.gov.au

Title page photograph: Grey-headed Flying-foxes roosting in Commonwealth Park, photographer: Lachlan Adams.

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Executive Summary

The Grey-headed Flying-fox (GHFF) is a listed Vulnerable species in the ACT due to a national population decline (>30% over the past three generations of the species (18–21 years), that will likely continue into the future). The decline is caused by the loss of native foraging habitat. The species plays a very important role as a nocturnal pollinator and long-distance seed disperser in Australia's native forests, woodlands and mangrove ecosystems. The primary food sources are the flowers of *Eucalyptus*, *Banksia* and *Melaleuca* species as well as rainforest fruits. They are distributed along the east coast of Australia from Queensland to Victoria and South Australia. GHFFs used to mainly inhabit native forests, however deforestation and loss of native vegetation is driving the migration of GHFFs into urban areas, following the flowering of remnant vegetation and fruit provided in backyard orchards.

The ACT has an established GHFF colony in Commonwealth Park (on Commonwealth managed land), which was formed in 2003 due to food shortages in Queensland. GHFF migrate to Canberra around October each year to establish a maternity colony for the final trimester of gestation and their peak birthing, creche and conception periods. Once summer food sources have been exhausted, they move back to warmer places, usually by mid-May. The ACT provides habitat and food for significant numbers of GHFF during critical life stages (maximum of 8,000 in 2021 and around 5,000 in 2023). Therefore, the efforts to protect the GHFF in the ACT are significant for the overall conservation of the species.

Based on experience elsewhere, movement of the camp into other areas has a high likelihood of occurring within coming decades. In addition, the number, size and permanency of camps may increase in the ACT in the future, as the GHFF is believed to respond to changes in the availability of food sources by migrating between camps. GHFFs forage all around the ACT at night, relying on blossoms and fruit during their stay in the ACT. Therefore, there is a compelling need for the ACT to plan for responses to the potential establishment of camps on ACT land and provide safe foraging habitat.

The Native Species Conservation Plan (NSCP) for the GHFF has been developed under the *Nature Conservation Act 2014*. It supports the delivery of the National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus* (Department of Agriculture Water and the Environment (DAWE) 2021) and provides a framework for conserving GHFFs in the ACT.

This plan has six main outcomes:

1. GHFF habitat is better protected and enhanced in the ACT
2. The size and dynamics of the GHFF population in the ACT are known and tracked over time
3. Mass mortality of GHFFs due to extreme weather events (EWEs) is prevented
4. The number of GHFF trapped in household netting decreases over time
5. ACT Government and community is well prepared for GHFF migration onto ACT land
6. The ACT community co-exists harmoniously with GHFFs

This plan complements the current *Commonwealth Park Grey-headed Flying-fox Camp Management Plan* (Commonwealth Park Plan) (NCA 2020) and outlines several short-term actions that will help to prepare for the migration of this species into ACT owned land.

Climate change and habitat modification is driving migration of species into new habitats. Co-habitation with new species requires increased awareness and education, risk mitigation and collaboration, in order to live harmoniously with new species on Ngunnawal Country.

Introduction

The Grey-headed Flying-fox (*Pteropus poliocephalus*) (GHFF) is one of the largest bats in the world and is one of the two species of flying-foxes that only occur in (or are endemic to) Australia (along with the Little Red Flying-fox (*Pteropus scapulatus*)).

This GHFF Native Species Conservation Plan (plan) outlines conservation management information and actions for the GHFF on stated land in the ACT (excluding land managed by the *National Capital Authority* (NCA)). This plan complements the National Recovery Plan for the Grey-headed Flying-fox (National Recovery Plan) (DAWE 2021) under the EPBC Act and the objectives and actions outlined in the Commonwealth Park Plan, which guides the NCA's management of that camp.

Conservation status

The GHFF is listed as Vulnerable nationally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and is also included in the threatened species lists of other states and territories throughout its range (except Queensland). In 2021, the International Union for Conservation of Nature (IUCN) reassessed the GHFF and retained it as Vulnerable due to a continuing population decline caused by substantial loss and degradation of foraging habitat because of fire and clearing, mass mortalities associated with extreme heat and food shortages, and mortality from electrocution on power lines, and entanglement in barbed wire and fruit tree netting (Eby et al. 2021). The statutory listing status of the GHFF is provided in Table 1.

Jurisdiction	Legislation	Status
Commonwealth	*Environment Protection and Biodiversity Conservation Act 1999*	Vulnerable
ACT	*Nature Conservation Act 2014*	Vulnerable
NSW	*Biodiversity Conservation Act 2016*	Vulnerable
Victoria	*Flora and Fauna Guarantee Act 1988*	Vulnerable
SA	*National Parks and Wildlife Act 1972*	Rare
Queensland	*Nature Conservation Act 1992*	Least Concern

Table 1. The listing status of the GHFF under Australian threatened species lists.

National

In 2001, the Commonwealth Threatened Species Scientific Committee (TSSC) considered available data from counts of GHFF conducted in 1989 and 1998–2001. A comparison of these counts showed a 30% decrease from at least 566,000 individuals in 1989 to at most 400,000 in 1998–2001 (HRSCEE 2017). This

qualified the species for inclusion in the Vulnerable category of the threatened species list under the EPBC Act.

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The GHFF is listed as Vulnerable under section 91 the *Nature Conservation Act 2014* (NC Act), in the ACT Threatened Native Species List under IUCN Criterion A—A2(a)(b)(c). The factors that make it eligible include: a continuing national population decline (>30% over the last three generations (18–21 years) which is predicted to continue into the future) due to the shrinkage in distribution and loss of over-wintering foraging habitat, and probable competition and hybridisation with the Black Flying-fox (*Pteropus alecto)* (ACT Scientific Committee 2019).

Policy context

The NC Act is the primary legislation in the ACT for the protection of native plants and animals, including management of reserves for conservation. The *ACT Nature Conservation Strategy 2013–2023* (The NC Strategy) (ACT Government 2013) provides guidance for the recovery of threatened species and ecological communities. The NC Strategy puts in place frameworks to manage ecological threats to our biodiversity and ecosystems.

The ACT Scientific Committee is consulted in the development of a native species conservation plan, which is a plan that details how the native species may be appropriately managed on stated land. For the GHFF, stated land is considered as land in the ACT that contains GHFF habitat as described in 'Objective 1' of this document.

The development of this plan is also guided by the following documents:

- *Nature Conservation (Grey-headed Flying-Fox) Conservation Advice 2019* (ACT Scientific Committee 2019).
- *National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus* (DAWE 2021)
- *Commonwealth Listing Advice on Pteropus poliocephalus (Grey-headed Flying-fox)* (TSSC 2001)
- *The Action Plan for Australian Bats* (Duncan et al. 1999)
- *Commonwealth Park Grey Headed Flying-Fox Camp Management Plan* (NCA 2020).
- *Flying-fox Camp Management Policy* (OEH 2015)
- *Flying-Fox Campsite Management Plan Yarra Bend Park* (Department of Sustainability and Environment 2005)
- *Flying-fox Camp Management Code of Practice 2018 under the Biodiversity Conservation Regulation 2017* (Minister for the Environment 2018)

GHFF rescued by ACT Wildlife

Current and emerging threats to GHFF

There are a wide range of threats, both natural and anthropogenic, to the GHFF population across its distribution that have been identified in the National Recovery Plan (DAWE 2021), management plans from other jurisdictions, or in consultations and studies conducted within the ACT. In the ACT, the main threats to GHFFs include:

- habitat loss and degradation
- interaction with human infrastructure and related mortality such as entanglement in barbed wire fencing and fruit netting, or electrocution from power lines
- climate change impacts, including an associated increase in the severity and frequency of heat waves, cold snaps and drought periods.

Habitat loss and degradation

During the 1990s, the loss of foraging and roosting habitat in southern Queensland and northern and central New South Wales led to significant GHFF population declines, largely through the clearance of native vegetation for agriculture, forestry operations and urban development (Duncan et al. 1999). Habitat loss and the resulting population decline in NSW was the primary cause of the species being listed as Vulnerable under the EPBC Act.

Although most habitat loss has occurred outside the ACT, impacts on populations and habitat in the ACT result in an increased pressure on the remaining suitable vegetation to support a larger number of GHFF. This can lead to increased damage to trees in camps, as has occurred in other areas e.g., Melbourne Botanic Gardens (DSE 2005).

As highlighted in the National Recovery Plan (DAWE 2021), the important winter and spring vegetation communities are those that contain *Eucalyptus tereticornis*, *E. albens*, *E. crebra*, *E. fibrosa*, *E. melliodora*, *E. pilularis*, *E. robusta*, *E. seeana*, *E. sideroxylon*, *E. siderophloia*, *Banksia integrifolia*, *Castanospermum*, *Corymbia citriodora citriodora*, *C. eximia*, *Grevillea robusta*, *Melaleuca quinquenervia* or *Syncarpia glomulifera*. Where the existence of these important winter and spring flowering vegetation communities is verified in the field, they are considered habitat critical to the survival of the GHFF (DAWE 2021). Many of these species are present in the ACT (including *Eucalyptus tereticornis*, *E. albens*, *E.crebra*, *E. fibrosa*, *E. melliodora*, *E. paniculate*, *E. pilularis*, *E. sideroxylon* and *Grevillea robusta)* providing suitable foraging habitat for the GHFF.

GHFF in the ACT feed from native vegetation in Spring when flowering occurs. Later in the season they rely on fruit trees in household backyards. A critical period for GHFF in the ACT is during Autumn when food availability is very limited. For example, a total of 115 GHFF pups were found dead at the Commonwealth Park camp by ACT Wildlife over 2023–24, likely due to lack of food resources.

Climate change

Climate change is likely to increase incidences of extreme heat events and negatively affect GHFF (Welbergen et al. 2008). Heat stress disproportionately impacts female and juvenile GHFFs as female GHFFs abandon young in response to high temperatures, and lactating mothers are more vulnerable to heat stress. The largest mass mortality events in the last decade were due to hyperthermia (Tidemann and Nelson 2011). For example, during 2019–2020, 85 flying-fox die-off events were recorded in NSW, ACT, Victoria, and South Australia due to extremely high temperatures, resulting in at least 54,000 GHFF and Black Flying-fox deaths (DAWE 2021). GHFFs are extremely vulnerable to temperatures above 38°C due to their inability to sweat, and it has been recorded that the species has suffered widespread mortality when temperatures reach 42°C (Welbergen et al. 2008; Snoyman et al. 2012; Bishop et al. 2019). A total of 35 heat stress events have occurred in Australia since 1994, with the largest single event on record being 45,500 deaths across 52 south-east QLD camps in the summer of 2014 (NCA 2020).

An increase in the incidence of extreme weather events due to climate change, such as more severe storms and heat waves, will likely increase direct mortality and affect the ability of habitat to physically support camps. In early 2020, the GHFFs in Commonwealth Park were impacted for months by the effects of bushfires and their lingering smoke, high temperatures, and a devastating hailstorm (NCA 2020). An estimated 600 GHFFs died due to those climatic events. In addition, GHFFs have been known to abort foetuses and birth prematurely in response to environmental stress (McIlwee and Martin 2002).

Impacts of climate change may also include changes to the phenology (annual life cycles) and productivity of key food species (Woinarski 2014). Climate change induced alteration of rainfall patterns may exacerbate the impacts of habitat reduction and the availability of food resources during key periods of the year. In the ACT, this is primarily from October to May when camp numbers are highest. In drought, eucalypt flowering times are altered, which reduces the amount of food available to the GHFF resulting in animals needing to forage further afield and potentially relocate camps to other locations within the ACT (DAWE 2021).

The GHFF is slow to reach sexual maturity and has a low reproductive rate, limiting the capacity for population increase, even under ideal conditions, or to recover from frequent or persistent threatening processes (McIllwee and Martin 2002; DAWE 2021a).

Climate change is likely to increase the incidence of extreme hot days and cold snaps, drought and fires with cascading effects on food shortages and thus increasing incidences of flying-fox morbidity and mortality. Monitoring temperature and humidity at the colony, and assisting in the response to extreme weather events, could significantly reduce GHFF fatalities due to extreme temperatures.

Interaction with human infrastructure

GHFFs are increasingly establishing in urban settings because food and shelter are currently more abundant than in the natural forest/woodland ecosystems (Roberts et.al 2012). The loss of natural habitat and the attractiveness of year-round food availability in urban areas both contribute to this change. Urban areas can also provide refuge from predation and be easier to navigate due to the open nature of the urban landscape with an abundance of landmarks and lighting (Parry-Jones and Augee 2001), although GHFFs in urban areas also encounter infrastructure that contribute to their decline.

Inappropriate fruit tree netting is one of the primary reasons that GHFF need rescuing by ACT Wildlife. During the 2023–24 season, 47 GHFFs were rescued by ACT Wildlife due to entanglement in fruit tree netting. This is a significant number of animals that needed care until they recovered from injuries and could be returned to the camp.

For more information on the species see *Additional Background Information* section (p21-25).

Vision

The ACT provides quality roosting and foraging habitat for its Grey-headed Flying-fox population, allowing them to safely reproduce here and coexist with the ACT community.

Outcomes

This plan is designed to complement the current management of the GHFF camp at Commonwealth Park. It has six main target outcomes and sets out key actions to achieve them.

1. **GHFF habitat is better protected and enhanced in the ACT**
   - 1a. GHFF key foraging areas and plant species are identified and mapped in the ACT
   - 1b. GHFF foraging habitat is included in the ACT Ecological Network Dashboard
   - 1c. The community and relevant government entities have access to guidance on GHFF foraging plants to promote planting of these species in non-sensitive areas in the ACT
   - 1d. Knowledge is built on potential alternative roosting habitat for GHFF in non-sensitive areas in the ACT and possible restoration actions to attract GHFFs to a new camp
2. **The size and dynamics of the GHFF population in the ACT are known and tracked over time**
   - 2a. GHFFs are counted annually
   - 2b. The reproductive outcome of the ACT colony is monitored annually
   - 2c. The number and main causes of GHFF deaths are known in the ACT
   - 2d. GHFF data is incorporated into the Threatened Species Dashboard in the ACT
3. **Mass mortality of GHFFs due to extreme weather events (EWEs) is prevented**
   - 3a. A protocol for responding to EWEs is in place and the ACT Government participates in EWE responses at camp
   - 3b. Temperature and humidity are constantly monitored in summer to predict extreme weather events and react before a mass mortality event occurs
4. **The number of GHFFs trapped in household netting decreases over time**
   - 4a. The transition of households to using wildlife-friendly netting is continued and enforced
   - 4b. The number of GHFFs trapped in household netting is tracked
   - 4c. ACT Wildlife carers have access to up to date training to care for rescued GHFFs
5. **ACT Government and community is well prepared for GHFF migration onto ACT land**
   - 5a. A camp management plan is prepared in the event that GHFFs establish a camp in a non-sensitive area of the ACT
6. **The ACT community co-exists harmoniously with GHFFs**
   - 6a. Public awareness and perception of GHFFs is improved through strong effective collaboration with community groups and proactive dissemination of GHFF's information by the ACT Government

These outcomes aim to address conservation issues and align with proposed management actions recommended in the Conservation Advice for the species (ACT Scientific Committee 2019):

- to reduce the impact of threatening processes on Grey-headed Flying-foxes and arrest decline
- to conserve the functional roles of Grey-headed Flying-foxes in seed dispersal and pollination
- to improve the standard of information available to increase community knowledge of the species and reduce the impact of negative public attitudes on the species.

Similarly, the objectives also align with the *ACT Nature Conservation Strategy 2013–23* by:

- increasing community health and wellbeing through improved understanding and support for biodiversity protection
- maintaining and improving native vegetation and biodiversity through improved habitat protection and connectivity
- assisting the landscape's resilience to climate change through effective management.

GHFFs flying out of camp in Commonwealth Park to forage overnight, November 2023.

Outcomes and proposed actions

1. GHFF habitat is better protected and enhanced in the ACT

1a: GHFF key foraging areas and plant species are identified and mapped in the ACT

Identifying and protecting GHFF foraging habitat, including any spatial and temporal variations in resource availability, is key for the health of the entire GHFF population, as the ACT currently provides quality and safe roosting and foraging habitat for GHFFs during key life stages.

A first step to protect GHFFs' habitat is to identify feeding areas in the ACT. This could be done using the vegetation type map layer in the ACT to locate the known plant species on which GHFFs feed. In addition, Canberra Nature Map sightings could be used to identify foraging trees in urban areas and complement research to create a more complete picture of where GHFFs feed in the ACT.

1b: GHFF foraging habitat is included in the ACT Ecological Network Dashboard

Critical habitat for the persistence of GHFF has not been identified and considered in planning and development frameworks and processes, such as strategic assessments and offset arrangements. The information generated above will be used to develop a map of foraging habitat in the ACT, which should be considered as critical habitat for the persistence of the species and incorporated in the ACT Ecological Network Dashboard to be considered when assessing urban development projects.

1c: The community and relevant government entities have access to guidance on GHFF foraging plants to promote planting of these species in non-sensitive areas in the ACT

GHFFs are migrating to urban areas more frequently due to loss of native vegetation in the wild. Providing food in safe, non-sensitive urban areas is becoming increasingly important for the survival of GHFF. Developing and implementing a strategic revegetation plan for the ACT, that seeks to improve the extent, condition, and viability of foraging habitat will help provide year-round food resources and help mitigate winter and spring shortages. A 30% canopy cover by 2045 has been set as an outcome of the ACT Urban Forest Strategy 2021–2045, which will require an increase in planting programs. Species that GHFF forage from should be considered in revegetation works so trees that attract GHFF are planted in non-sensitive areas and avoided in sensitive areas. Such action aligns with Action 4.2.1 in the Urban Forest Strategy 2021–2045: Implement strategic planting to support wildlife and enhance movement and foraging opportunities across the city and wider landscape. Promoting integration of GHFF foraging trees into ACT planting programs will help to increase foraging habitat in urban and rural areas.

1d: Knowledge is built on potential alternative roosting habitat for GHFF in non-sensitive areas in the ACT and possible restoration actions to attract GHFFs to a new camp

Once GHFFs establish roosting camps in an area, they are very hard to promote their dispersal into other areas (e.g. generally done by disturbing them using loud noises). Dispersal of such camps might be needed if they move camps into sensitive areas (e.g. aged-care and childcare centres, schools, hospitals and

airports). A revision of 17 known flying-fox dispersal actions used between 1990 and 2003 concluded that in all cases, dispersed animals did not abandon the local area and they did not move far (<600 m from the original site, contingent on the distribution of available vegetation). In 85% of cases, new camps were established nearby and repeated dispersal actions were required. In addition, it was not possible to predict where alternate camps would form and the financial costs of dispersal efforts were high. For instance, the relocation of the GHFF camp from the Melbourne Botanical Gardens to Yarra Bend Park in Fairfield took continuous effort for six months, and cost approximately $3 million with additional ongoing management required (Roberts and Eby 2013).

A strategy to avoid dispersal actions is to promote migration of flying-foxes into new roosting areas by revegetating potential flying-fox roosting habitat to encourage the relocation away from residential areas or other sensitive areas. This mechanism has been used successfully to relocate flying-foxes in Lake Macquarie, NSW (see Blackalls Park flying-fox camp - Lake Macquarie City Council). Identification of potential good quality roosting habitat and revegetation of these potential sites will be needed in advance to allow for vegetation to reach the desired cover. Ecosure (2020) identified potential future roosting habitat around Lake Burley Griffin. These potential roosting habitat sites and other options could be considered and analysed for feasible revegetation projects to provide alternative roosting habitat for the GHFF.

2. The size and dynamics of the GHFF population in the ACT are known and tracked over time

Monitoring is necessary to evaluate both the management requirements of threatened species and management effectiveness of the actions taken to improve the status of the species. The Australasian Bat Society (ABS) has been surveying the camp at Commonwealth Park since it was first recorded in 2003. These data have been used to monitor the overall trend of the entire GHFF population by the National Flying Fox Monitoring program. In addition, ACT Wildlife records the numbers of GHFF found dead at camp, electrocuted, or trapped in netting. This information, as well as the yearly reproductive outcome of GHFF in the ACT camp, is crucial to understand if the actions in this plan are having an impact at maintaining the numbers of GHFFs that arrive in the ACT each year by reducing mortality and evaluating if the actions need to be adjusted. The ACT Government will incorporate monitoring data on annual counts, mortality, and reproductive output in the newly planned Threatened Species Dashboard.

3. Mass mortality of GHFFs due to extreme weather events (EWEs) is prevented

3a. A protocol for responding to EWEs is in place and the ACT Government participates in EWE responses at camp

ACT Wildlife and NCA have developed a Flying-Fox Extreme Weather Event (EWE) Plan to respond in a timely and effective manner to extreme weather events including hailstorms, cold snaps, and heat waves (e.g. turn water sprinkle system on to reduce heat stress). The ACT Government veterinary officers have provided input into the EWE plan, and they are also responders in these emergencies. The ACT Government will continue to discuss preparations for the extreme weather season and assist in responding to EWEs, including providing ACT Wildlife with a list of vaccinated veterinarians that can help during EWE events.

3b. Temperature and humidity are constantly monitored in summer to predict EWEs and react before a mass mortality event occurs

Monitoring temperature and humidity at a camp is key to responding quickly to EWEs to assist the colony when these parameters exceed the safe threshold for GHFF. However, current monitoring uses more general broad-scale Bureau of Meteorology data (e.g, from the airport) that cannot account for significant variations at camp. Small weather stations have been used to monitor temperature and humidity in other camps with alarms triggered when thresholds are reached. Supporting ACT Wildlife to acquire such equipment will help respond to EWEs more accurately. This monitoring would assist with tracking the particular camp conditions at which GHFFs start to react to stressful temperature and humidity conditions.

4. Number of GHFFs trapped in household netting decreases over time

Information flyer on Wildlife-friendly fruit netting designed by ACT Government to support ACT Wildlife in this campaign.

4a. The transition of households to using wildlife-friendly netting is continued and enforced.

Legislation prohibiting ACT households using tree netting with a mesh size greater than 5 mm x 5 mm commenced in April 2024. Wildlife-friendly netting is available at local retail shops in Canberra and online, and some major vendors now exclusively stock wildlife-friendly netting for residential use. The legislation includes a requirement for retailers stocking non-wildlife-friendly netting to inform shoppers that the

netting does not comply with legislation and is prohibited for use, in order to assist Canberrans to make an informed choice and avoid inappropriate netting. The ACT Government is supporting ACT Wildlife to help residents switch to wildlife-friendly netting through a Fruit Tree Netting Swap Program.

4b. The number of GHFFs trapped in household netting is tracked

ACT Wildlife rescues GHFFs trapped in household netting and keeps records of these eventualities. Tracking these numbers over time is key to understanding if the change to using wildlife-friendly netting is reducing the number of GHFF getting trapped in inappropriate netting.

4c. ACT Wildlife carers have access to up to date training to care for rescued GHFFs

Volunteers that care for GHFFs need to have the appropriate training to feed and handle them, especially when they are caring for stressed individuals. Having access to up-to-date training to care for rescued GHFFs will facilitate the safety of volunteers and increase the likelihood of survival for GHFFs. ACT Government has provided ACT Wildlife with funding for volunteers to undertake such training.

5. ACT Government and community is well prepared for GHFF migration onto ACT land

5a. A camp management plan is prepared in the event that GHFFs establish a camp in a non-sensitive area of the ACT

In Canberra, the GHFF may move from the Commonwealth Park camp if the population of the camp reaches capacity or if disturbances promote camp migration. Camps might establish in other urban areas in parks or near residential areas, which increases the likelihood of GHFF interactions with residents. Ecosure (2020) has modelled potential future flying-fox camp locations using habitat scores. Potential areas for future camps are Sullivans Creek, Australian National Botanical Gardens, Glebe Park and Anzac Parade. When preparing for the establishment of a GHFF camp it is important to act promptly to prevent the establishment of a camp in sensitive areas.

If camps are established on ACT Government managed land, a camp management plan (CMP) should be developed. *In situ* management of GHFF camps will be important for reducing human-GHFF conflict and any disturbances caused by human activity. A CMP guideline should be developed that can be adapted for particular sites according to factors such as threats, extent of camp usage, time of year, or risks to the surrounding environment. A CMP should describe which actions and activities are acceptable around the camp and provides mitigation protocols for higher-risk actions along the lines of the Commonwealth Park Plan.

6. The ACT community co-exists harmoniously with GHFFs

Several risks emerge when GHFFs establish in urban areas, both to the species and to people. Tolerance for GHFFs by the community can rapidly deteriorate when people become affected by noise, smell, excrement, defoliation, and excessive take of fruit from backyards and orchards. Tait et al. (2014) found that residents and businesses close to camps may experience property damage to houses, cars and gardens, water tank contamination, and reduced enjoyment of public parks for gatherings and events. The number, size and permanency of camps can be expected to increase in the ACT in the future, as the GHFF is believed to

respond to changes in the availability of food sources by migrating between camps (Eby 2000). Educating the public around the ecological value of this species will help to create a positive image of GHFFs, which could help with conflict resolution in the future.

6a. Public awareness and perception of GHFFs is improved through strong effective collaboration with community groups and proactive dissemination of information on GHFF's

Recovery of the GHFF cannot occur without significant community participation. In several areas, negative public attitudes toward the species act as an impediment to the recovery process. The continued clearing of GHFF habitat for urban and rural development both reduces the habitat available and increases the conflict between GHFFs and people. As well as protecting GHFF habitat, strategic programs of public education are needed to improve co-existence between people and GHFFs and reduce this conflict.

Educating the community on the ecological importance of the GHFF and implementing a campaign to provide information and advice could mitigate potential human conflict. The campaign should disseminate information in a range of formats on:

- the new wildlife-friendly netting legislation
- the ecological value of GHFFs
- the threats to the survival of the species
- dispelling myths about GHFFs
- encouraging changes in attitudes to understand that GHFF are intelligent, social and charming animals.

Collaboration between ACT Government and community groups will be essential to creating a better relationship with this threatened species.

The ACT Government, in collaboration with ACT Wildlife, already runs a "Bat night" in Commonwealth Park as part of the Jerrabomberra Wetlands "Young Rangers" program. Extending this activity to more groups in the broader community would be a great opportunity for people to get familiar with this species. The ACT Government is funding ACT Wildlife to run three "Bat night" events at the Commonwealth Park in 2024–25.

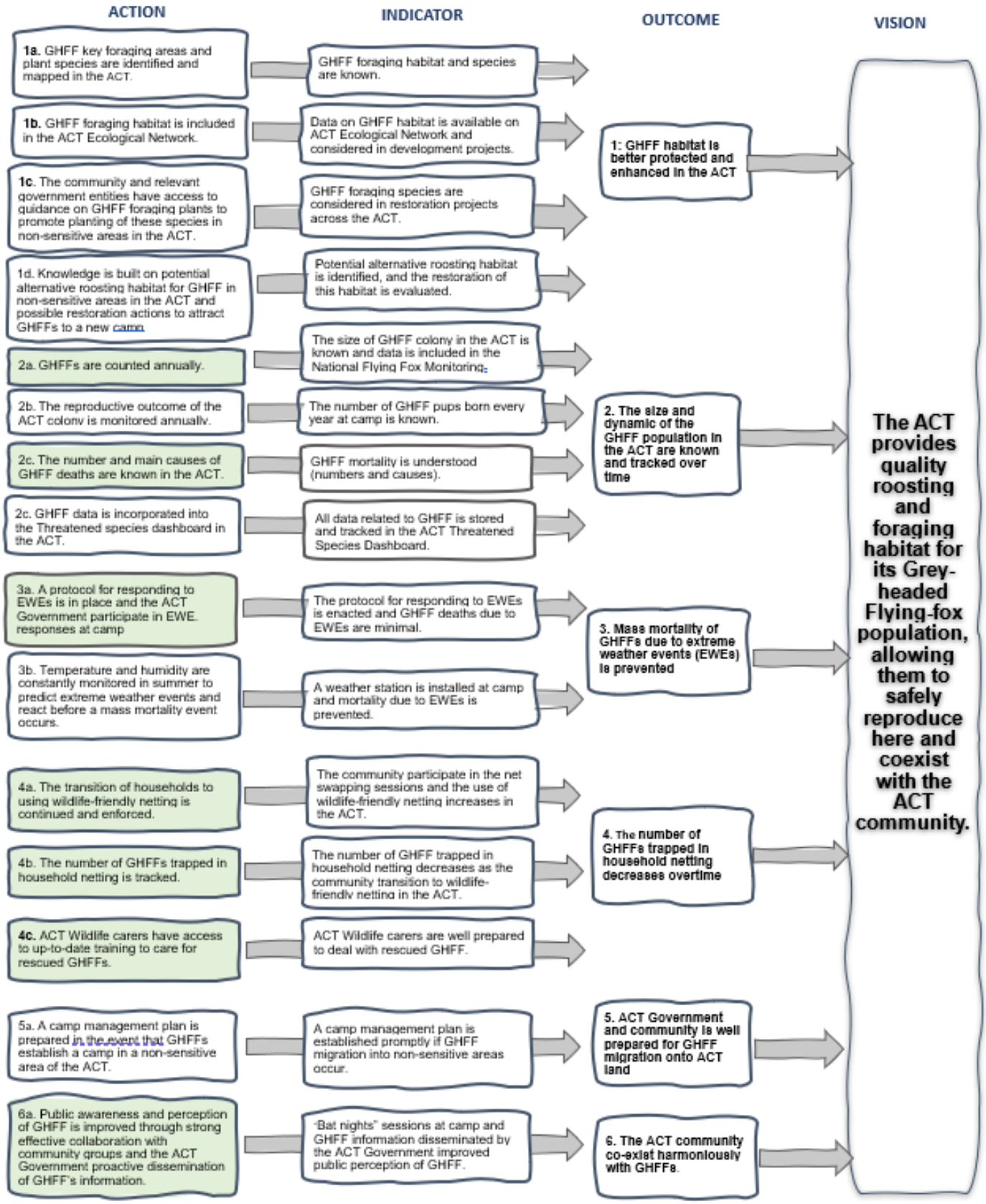

Figure 1: Actions, Indicators and outcomes to achieve the GHFF NSCP vision. Actions in green are in progress.

Implementation, monitoring and review

This plan has been developed through consultation with key stakeholders and experts. Successful implementation will require a range of stakeholders (both within and outside of the ACT Government) to realise the objectives and actions under this plan.

Section 124 of the NC Act requires the Conservator, the lessee of leased land (if applicable) and the custodian of the land (if applicable) to implement a native species conservation plan. This plan will be implemented by ACT Government staff with expertise in ecological monitoring and conservation practices, and potentially Government areas working in restoration of urban and rural areas and ACT Wildlife. Section 125 of the NC Act requires the Conservator to monitor the effectiveness of this plan. The legislation does not stipulate a statutory timeframe for monitoring and review; however, the plan should be reviewed frequently to ensure it is meeting its objectives and adjusted within an adaptive management framework as required. The actions outlined in this plan are to be developed in the short term (2-3 years) and will require review after that period to ensure the actions are still relevant and effective to achieve the stated outcomes.

Appendix A summarises the actions and corresponding indicators of success for this plan. It also includes timeframes and milestones that trigger review against each action.

ACT Wildlife carers in Commonwealth Park discussing GHFF ecology during Young Rangers Bat Night, organised by ACT Government, November 2023 (Photo – Lachlan Adams)

Grey-headed Flying-fox in care in an ACT Wildlife facility, January 2024

Additional Background Information

Description

GHFFs are Australia's largest bat. Adult GHFF males generally weigh 750–1,000 g, and weights, as high as 1,133 g, have been recorded (Ratcliffe 1932; Tidemann 1995; DECCW 2009). Adult females generally weigh 650–800 g. Although males and females differ in weight, their forearms are of similar length, 155–175 mm. Body fur is typically medium to dark grey, with many light-tipped hairs (Hall and Richards 2000). Fur on the head is also grey but varies in shade from near black to silver. An orange or russet-coloured mantle or collar encircles the neck, and leg fur extends to the ankle which distinguishes the species from the similarly sized Black Flying-fox (*Pteropus alecto*), the legs of which are bare below the knee. Wing membranes are black (DECCW 2009).

Through pollination and seed dispersal, the GHFF contributes to sustaining ecological processes within a variety of ecosystems, including within woodlands and forests of the ACT. It plays a key ecological role within the coastal regions of eastern Australia, including three of Australia's World Heritage Areas: K'gari (QLD), the Gondwana Rainforests (NSW and south-east QLD) and the Greater Blue Mountains (central NSW) (DAWE 2021).

The GHFF feeds on over 100 species of flowering trees and fleshy-fruited trees and vines (Eby and Law 2008) including *Eucalyptus*, *Banksia* and *Melaleuca* species. In doing so, they interact with numerous plant communities and assist with seed and pollen dispersal of its food plants within these communities (Eby 1996; Tidemann and Vardon 1997). Some estimates suggest a single GHFF can disperse up to 60,000 seeds in one night, travelling up to several thousand kilometres between camps in a couple of days (HRSCEE 2017).

Actions to manage and improve foraging and roosting habitat will benefit several hundred vegetation communities in Queensland, New South Wales and Victoria (Eby and Law 2008). Nectar and fruit feeding bats, birds and mammals will also benefit, as will a range of other fauna that occupy the forest and woodland communities used by the GHFF.

Distribution and habitat

The GHFF is endemic to eastern Australia, with a distribution ranging from Bundaberg in Queensland to Melbourne in Victoria. The range extends from the coast to the western slopes of New South Wales (NSW) with reports also from South Australia (TSSC 2001). The latitudinal range of GHFF appears to have changed little since the 1800s (Roberts et al. 2012), the southern part of the range has tended to be occupied by summer migrants. Since the 1980s, there has been a southerly expansion in roosts occupied year-round from Mallacoota to Melbourne, Victoria (Williams et al. 2006). Since 2011, new permanent roosts established as a result of westerly expansion beyond Melbourne in Victoria, and as far west as Adelaide (Boardman et al. 2021) and Port Augusta, South Australia. One of the main drivers for this is thought to be the diversity of winter foraging resources in urban areas (Williams et al. 2009; Yabsley et al. 2021).

The distribution of the flying-fox population responds rapidly to changes in resource distribution with entire regions being colonised or vacated in short periods (Westcott et al. 2011). In the past, temporary camps established during food shortages were abandoned once conditions improved elsewhere. Since the mid-

2000s, an increasing number of these temporary camps have persisted despite food availability elsewhere, leading to an increase in the inland presence of GHFF. For example, the Commonwealth Park camp in Canberra was formed during the 2003 food shortage in Queensland and NSW (CNM 2018), a Tumut camp formed during the 2010 food shortage, as did camps in Bendigo and Adelaide. Many of these 'new' camps currently record consistent seasonal numbers of GHFF.

Throughout its distribution, the GHFF is found in a wide variety of habitats, including tropical moist forest, open forest, closed and open woodlands, Melaleuca swamps, Banksia woodlands, Mangrove ecosystems, and commercial fruit plantations. The species also occurs in urban areas where suitable foraging is available close to suitable roosting habitat (Lunney et al. 2008).

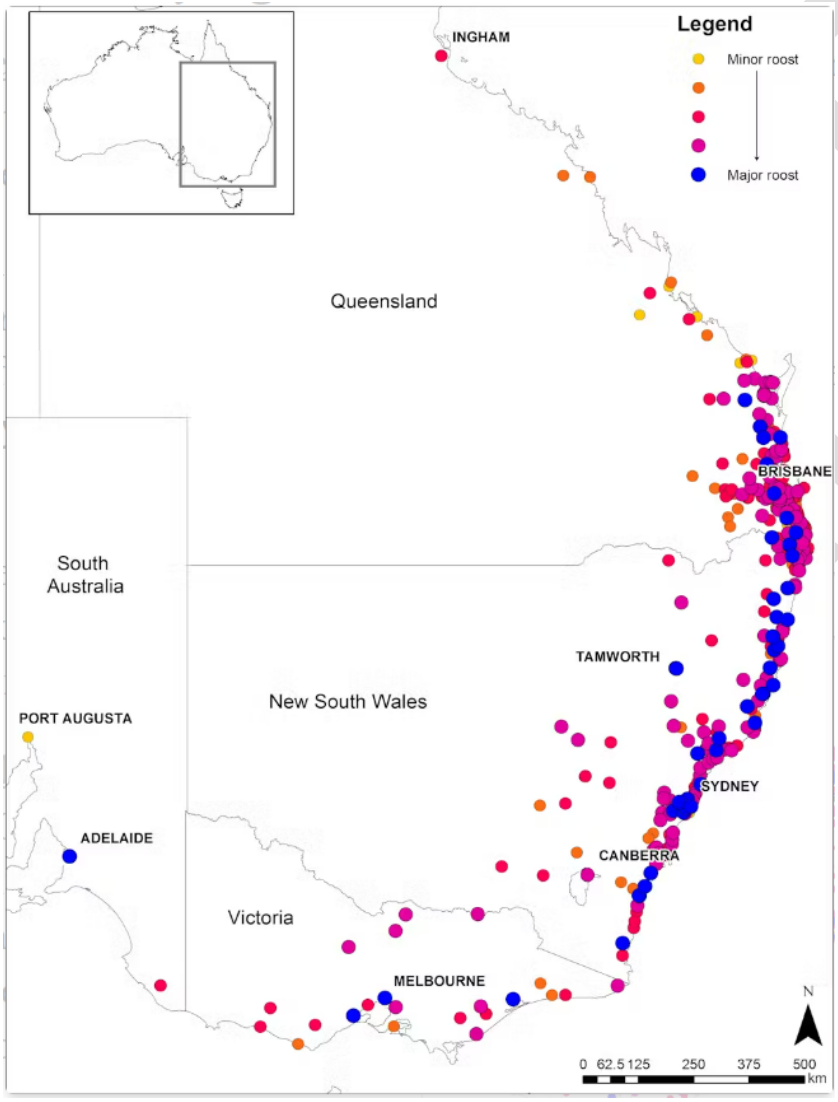

Figure 3: Map of Grey-headed Flying-fox counts across its distribution. Minor roosts had fewer than 100 individuals while major roosts had more than 100,000 (Eric Vanderduys in the Conversation, March 2024)

All the GHFF in Australia are regarded as one population that moves around freely within its entire national range (Webb and Tidemann 1996; DoE 2015). GHFF may travel up to 100 kilometres in a single night with a foraging radius of up to 50 kilometres from their camp (McConkey et al. 2012). They have been recorded travelling over 500 kilometres over 48 hours when moving from one camp to another (Roberts et al. 2012).

GHFF generally show a high level of fidelity to camp sites, returning year after year to the same site, and have been recorded returning to the same branch of a particular tree (SEQ Catchments 2012).

Breeding season

GHFFs are seasonal breeders, with a single breeding event each year, with births typically occurring between October and November/December (Churchill 2008; Divljan 2008) after a 6-month gestation. Females generally reach sexual maturity in their second year and give birth to a single pup, annually; however, it is thought that few females younger than three years successfully raise young to independence (McIlwee and Martin 2002). Generation length is likely to be around six or seven years (Lunney et al. 2008). GHFF migrate to Canberra to spend the final trimester and peak birthing, creche and peak conception periods in Commonwealth Park (Figure 2). Thus, Commonwealth Park provides habitat for GHFF during critical life stages. . Young are highly dependent on their mother for food and thermoregulation. Young are suckled and carried by the mother until approximately four weeks of age (Markus and Blackshaw 2002). At this time, they are left at the camp during the night in a crèche until they begin foraging with their mother between January and March (Churchill 2008) and are usually weaned by six months of age.

GHFFs roosting in Commonwealth Park, November 2023

The Commonwealth Park colony

In 2003, Dr Christopher Tidemann of The Australian National University (ANU) recorded an estimated 300 GHFF for the first time in trees in Commonwealth Park between Stage 88 and Nerang Pool (in the Rhododendron Garden). The camp has been occupied seasonally, every year since 2003, and is the only known long-standing camp in the ACT. The Australasian Bat Society Inc (ABS) has surveyed the

Commonwealth Park camp since 2003. All counts are made using a static ground-based method where roosting flying-foxes are counted during the day. This method is consistent with the national method developed by CSIRO (Westcott et al. 2011). Since 2013, the ABS has also been providing quarterly census survey data to the ACT and Commonwealth governments as part of the National Flying-fox Monitoring Program.

GHFF usually arrive in Commonwealth Park around early October, at peak birthing season, and they leave the camp in mid-May, after mating (Figure 4). The mating season (March to April) represents the period of peak camp occupancy (Markus 2002). Usually, no flying-foxes are recorded between June and August, however in 2014 the camp was occupied during winter at very low numbers. The reason for the variation in flying-fox abundance throughout the year is unknown but it is likely related to food availability (Westcott et al. 2011) and climate (Parris and Hazell 2005). GHFF abundance in the Commonwealth Park colony has generally increased over time. The maximum numbers of GHFF were recorded in 2021 (n = 9,159). The 2022 peak abundance was 4,079 with a larger peak being reported for 2023 of 5,295 GHFFs counted in March (Wilson 2023).

A colony was observed repeatedly (though not consistently) in 2020–2021 at Lake Ginninderra, on ACT Government land.

GHFFs roosting in the Commonwealth Park colony camp, November 2023.

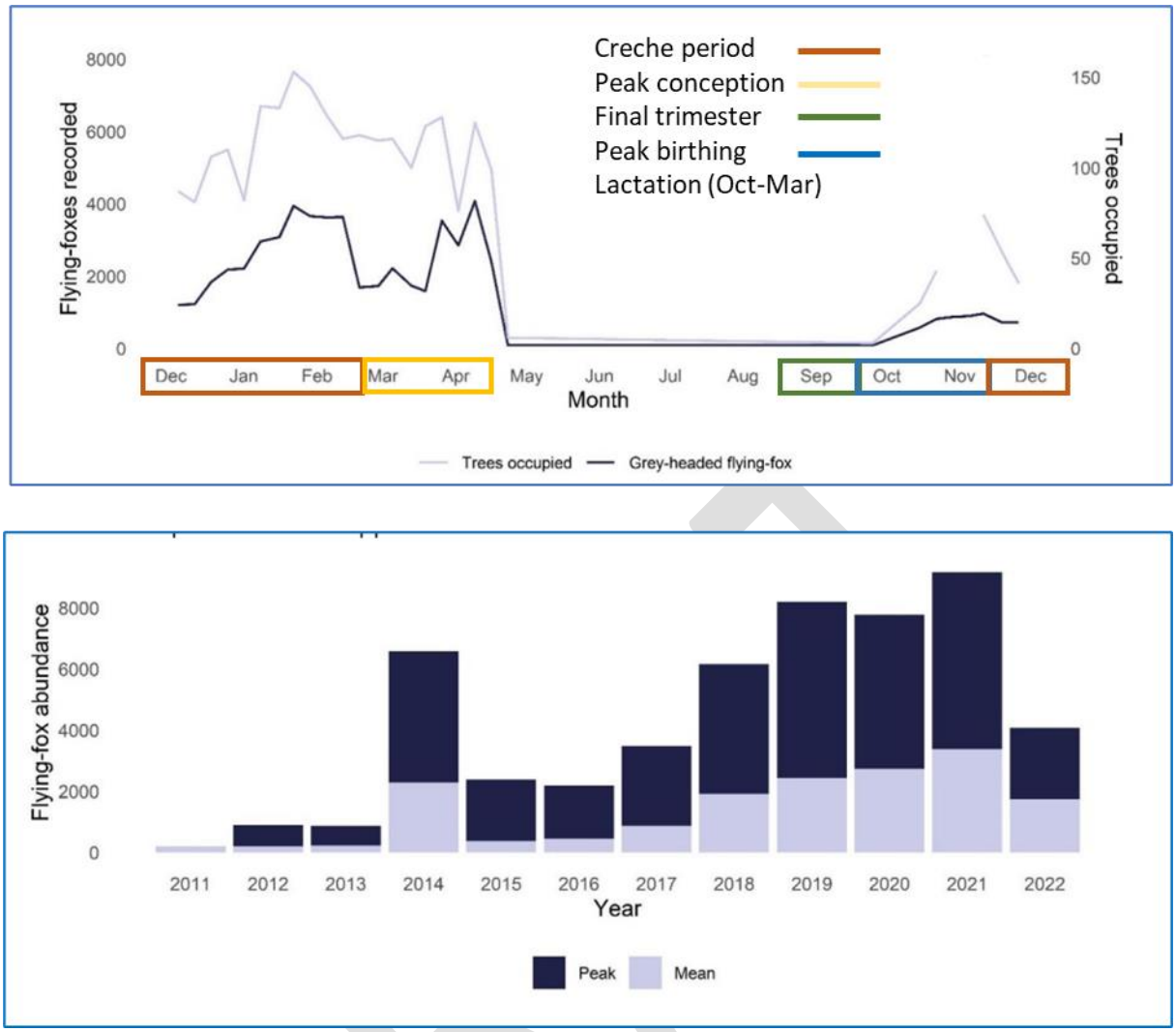

Figure 2: Abundance of GHFFs in Commonwealth Park and numbers of trees occupied by GHFF in 2022, highlighting the critical life stages that GHFF spend in this camp. Peak and mean numbers of flying-foxes recorded at Commonwealth Park camp, based on 239 surveys conducted between December 2011 and November 2022.

Cultural Importance

In other areas, the GHFF has significance to traditional custodians as a food source, a clan totem, an art subject and an indicator of particular habitat associations and seasonal and climatic changes, both annually and in the dreaming cycle (Ecobiological 2009). The literature indicates that Aboriginal people traditionally had an intimate understanding of many aspects of GHFF ecology, such as breeding and movement patterns, and that they carefully managed flying-fox habitat to protect the species (Ecobiological 2009). Historical records show that before 2003, GHFFs had been only occasional visitors to the ACT; a search of museum records and historical databases between 1965 and 2002 revealed 12 records in Canberra (Wilson 2023). GHFF numbers are increasing in Ngunnawal Country, understanding Ngunnawal knowledge and consideration around this species will enrich this plan and help with the conservation of the GHFF.

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Appendix A: Outcomes, actions, indicators and timeframes to be assessed during monitoring and review of this Plan

Actions	Indicator of success	Timeframe
Outcome 1: GHFF habitat is better protected and enhanced in the ACT		
1a. GHFF key foraging areas and plant species are identified and mapped in the ACT 1b. GHFF foraging habitat is included in the ACT Ecological Network Dashboard 1c. The community and relevant government entities have access to guidance on GHFF foraging plants to promote planting of these species in non-sensitive areas in the ACT 1d. Knowledge is built on potential alternative roosting habitat for GHFF in non-sensitive areas in the ACT and possible restoration actions to attract GHFFs to a new camp	• GHFF foraging habitat and species are known • Data on GHFF habitat is available on ACT Ecological Network Dashboard and considered in development projects • GHFF foraging species are considered in restoration projects across the ACT • Potential alternative roosting habitat is identified, and the restoration of this habitat is evaluated.	• Research into foraging areas starts in 2024 until 2025 • GHFF critical habitat is known, mapped and available in the ACT Ecological Network Dashboard by the start of 2026 • By mid-2026, a list of GHFF foraging species is ready for circulation • Alternative roosting habitat is identified and potential restoration projects to attract GHFF are considered and evaluated by 2027
Outcome 2: The size and dynamic of the GHFF population in the ACT are known and tracked over time		
2a. GHFFs are counted annually 2b. The reproductive outcome of the ACT colony is monitored annually 2c. The number and main causes of GHFF deaths are known in the ACT 2d. GHFF data is incorporated into the new ACT Threatened Species Dashboard	• The size of the GHFF colony in the ACT is known and data is included in the National Flying-fox Monitoring Program • The number of GHFF pups born every year at camp is recorded. • GHFF mortality is understood (numbers and causes recorded).	• Ongoing – GHFF at camp are counted annually by the Australasian Bat Society, funded by NCA • Ongoing – ACT Wildlife continue monitoring of deaths and entanglements. • Reproductive outcome measures start in 2025 and occurs annually

Actions	Indicator of success	Timeframe
	• All data related to GHFF is stored and tracked in the ACT Threatened Species Dashboard.	• A GHFF database in the Threatened species Dashboard is established by 2025
Outcome 3: Mass mortality of GHFFs due extreme weather events (EWEs) is prevented		
3a. A protocol for responding to EWEs is in place and the ACT Government participates in EWE responses at camp 3b. Temperature and humidity are constantly monitored in summer to predict EWEs and react before a mass mortality event occurs.	• The protocol for responding to EWEs is followed and GHFF deaths due to EWEs are minimal. • A weather station is installed at camp and mortality due to EWEs is prevented.	• Ongoing - The EWE protocol is reviewed annually and the ACT Government participates in preparations and emergencies • A grant was allocated to ACT Wildlife in April 2024 to provide a weather station • A weather station is installed by start of 2025
Outcome 4: The number of GHFFs trapped in household netting decreases over time		
4a. The transition of households to using wildlife-friendly netting is continued and enforced 4b. The number of GHFFs trapped in household netting is tracked 4c. ACT Wildlife carers have access to up to date training to care for rescued GHFFs	• The community participates in the net swapping sessions and the use of wildlife-friendly netting increases in the ACT. • The number of GHFFs trapped in household netting decreases as the community transition to wildlife-friendly netting in the ACT. • ACT Wildlife carers are well prepared to deal with rescued GHFF.	• ACT Wildlife runs a second netting swap program in Spring 2024 • Funding was allocated to ACT Wildlife in April 2024 for training for carers and the netting program • Ongoing – the number of GHFF that get trapped in netting is tracked over time
Outcome 5: ACT Government and community is well prepared for GHFF migration onto ACT land		

Actions	Indicator of success	Timeframe
5a. A camp management plan is prepared in the event that GHFFs establish a camp in a non-sensitive area of the ACT	• A camp management plan is established promptly and implemented if GHFF migration into non-sensitive areas occur	• Management plan is required as soon as GHFF migrate into non-sensitive areas
Outcome 6: The ACT community co-exists harmoniously with GHFFs		
6a. Public awareness and perception of GHFFs is improved through strong effective collaboration with community groups and the ACT Government's proactive dissemination of information on GHFF's	• "Bat night" sessions at camp are expanded and continue and GHFF information disseminated by the ACT Government improves public perception of GHFF. • The community understands what to do if a GHFF is found in backyards	• "Bat nights" are run in September and November 2024 and February 2025 • Ongoing – dissemination of GHFF information by the ACT Government

Appendix B: Alignment with other plans and strategies

ACT GHFF conservation plan outcome	Alignment with ACT Nature Conservation Strategy 2013-2023 strategies	Alignment with National Recovery Plan for the Grey-headed Flying-fox objectives	Alignment with NSW Strategy actions
1. GHFF habitat is better protected and enhanced in the ACT **2. The size and dynamic of the GHFF population in the ACT are known and tracked overtime**	• Strategy 2: Manage threats to biodiversity. • Strategy 3: Protect species and ecological communities. • Strategy 4: Enhance biodiversity value of urban areas.	• Recovery objective 1: Identify, protect and increase native foraging habitat that is critical to the survival of the GHFF. • Recovery objective 2: Identify and increase roosting habitat of GHFF • Recovery objective 3: Determine trends in the GHFF population so as to monitor the species' national	Increase the extent and viability of foraging habitat for the GHFF that is productive during winter and spring through dedicated habitat creation and restoration using guides published by OEH.

ACT GHFF conservation plan outcome	Alignment with ACT Nature Conservation Strategy 2013-2023 strategies	Alignment with National Recovery Plan for the Grey-headed Flying-fox objectives	Alignment with NSW Strategy actions
		distribution, habitat use and conservation status. • Recovery objective 8: Support research activities that will improve the conservation status and management of GHFFs.	
3. Mass mortality of GHFFs due extreme weather events (EWEs) is prevented **4. The number of GHFF trapped in household netting decreases overtime**	• Strategy 2: Manage threats to biodiversity. • Strategy 3: Protect species and ecological communities.		Develop site-based heat stress response protocols for camps likely to be affected by heat stress events. Protocols should be based on best practice guidelines.
5. ACT Government and community is well prepared for GHFF migration onto ACT land	• Strategy 2: Manage threats to biodiversity. • Strategy 3: Protect species and ecological communities.		
6. The ACT community co-exist harmoniously with GHFFs	• Strategy 5: Strengthen community engagement.	• Recovery objective 4: Build community capacity to coexist with flying-foxes and minimise the impacts on urban settlements from new and existing camps while avoiding interventions to move on or relocate entire camps. • Recovery objective 5: Increase public awareness and understanding of GHFFs and the recovery program,	• Conduct dedicated engagement programs in communities affected by flying-fox roost sites, building the capacity of all stakeholders to engage in the process of decision-making and developing camp management plans. • Provide information about mitigating the impacts of GHFFs on nearby residences and businesses such as strategic vegetation management, and structural modifications like double-

ACT GHFF conservation plan outcome	Alignment with ACT Nature Conservation Strategy 2013-2023 strategies	Alignment with National Recovery Plan for the Grey-headed Flying-fox objectives	Alignment with NSW Strategy actions
		and involve the community in the recovery program where appropriate.	glazing, air conditioning and shade cloths. • Distribute public education materials to land managers and local community groups working with contentious GHFF roost sites highlighting species status, reasons for being in urban areas, reasons for decline etc.