

SUPPORTER WELCOME AND SOUTH AUSTRALIA UPDATE

Jason Van Weenen | Team Leader, Urban Biodiversity | Department for Environment and Water

VICTORIA UPDATE

Rodney Vile | Principal Officer Wildlife Emergencies | Biodiversity Division | Department of Environment, Land, Water and Planning

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ACT UPDATE

Michelle Jeffrey | Manager Open Space | National Capital Authority

NEW SOUTH WALES UPDATE

Matthew Mo | Senior Project Officer - Threatened Species Issues Management | NSW Department of Planning, Industry and Environment

Sue Ellis | Flying-fox Project Manager | Local Government NSW

This presentation combines a reflection of the 20th anniversary of the grey-headed flying-fox being listed as a vulnerable species in NSW with an update on recent progress driven by the NSW Government's Saving our Species program.



QUEENSLAND UPDATE

Lindsay Delzoppo | Director Northern Wildlife Operations | Department of Environment and Science

AUSTRALIAN GOVERNMENT UPDATE

Tim McGrath | Threatened Species Officer | Department of Agriculture, Water and Environment



KOOLOONBUNG CREEK FLYING-FOX CAMP MANAGEMENT PLAN – DELIVERY OF ACTIONS

Byron Reynolds | Ecologist | Port Macquarie Hastings Council

The CMP was written in accordance with the NSW Flying-fox Camp Management Policy (2015) framework. The CMP was adopted by Port Macquarie Hastings Council (PMHC) June 2019. Several issues and constraints in achieving all actions from the CMP have been identified. This presentation provides an overview of actions completed and commenced. We talk about what has been done to achieve the actions and discuss some issues. Key issues include appropriate land use planning, effective property modifications for noise mitigation, effective buffers and education and awareness programs. We engaged acoustic consultants to undertake flying fox noise monitoring, prepare a model and recommend property modifications. We aim to use the model to aid in appropriate land use planning. We have identified appropriate land use planning is a key issue and difficult to resolve with current planning legislative framework. We aim to engage a planning consultant to prepare an options analysis. We have delivered two subsidy packages to mitigate noise, droppings, and smell. We evaluated the subsidies through surveys. We have installed and operated an irrigation system to create a buffer and evaluated effectiveness through 18 months of monitoring and resident survey. We have installed interpretive signage throughout Kooloonbung Creek to increase education and awareness. We are developing a long-term education and awareness program.



REVIEW AND EVALUATION OF CONVENTIONAL WISDOM ON THE ROOSTING OF FLYING-FOXES

Tamika Lunn | PhD Candidate | Griffith University

Fruit bats (Family: Pteropodidae) are animals of great ecological and economic importance, yet their populations are threatened by ongoing habitat loss and human persecution. A lack of ecological knowledge for the vast majority of Pteropodid bat species presents additional challenges for their conservation and management. In Australia, populations of flying-fox species (Genus: Pteropus) are declining and management approaches are highly contentious. Australian flying-fox roosts are exposed to management regimes involving habitat modification, either through human-wildlife conflict management policies, or vegetation restoration programs. Details on the fine-scale roosting ecology of flying-foxes are not sufficiently known to provide evidencebased guidance for these regimes and the impact on flying-foxes of these habitat modifications is poorly understood.

We seek to identify and test commonly held understandings about the roosting ecology of Australian flying-foxes to inform practical recommendations and guide and refine management practices at flying-fox roosts. We identify 31 statements relevant to understanding of flying-fox roosting structure, and synthesise these in the context of existing literature. We then contribute contemporary data on the fine-scale roosting structure of flying-fox species in south-eastern Queensland and north- eastern New South Wales, presenting a 13-month dataset from 2,522 spatially referenced roost trees across eight sites.

We show evidence of sympatry and indirect competition between species, including spatial segregation of black and grey-headed flying-foxes within roosts and seasonal displacement of both species by little red flying-foxes. We demonstrate roost-specific annual trends in occupancy and abundance and provide updated demographic information including the spatial and temporal distributions of males and females within roosts. Insights from our systematic and quantitative study will be important to guide evidence-based recommendations on restoration and management and will be crucial for the implementation of priority recovery actions for the preservation of these species into the future.



RESTORING FLYING-FOX HABITAT

Jen Ford | Principal Restoration Ecologist | Ecosure

Every year the challenges for flying foxes increase with a changing climate; increased catastrophic fires impacting available habitat; increased frequency and intensity of heat stress events; fragmentation of natural areas; the degradation of ecosystems including established roost and foraging sites; weeds further degrading ecosystems; and increased human / wildlife conflict as flying foxes look for refuge in more urban areas.

This presentation acknowledges the challenges, as well as the needs of flying foxes so we can better plan and apply a range of ecological restoration solutions based on sound science and proven practice. The restoration of many ecosystem types and sites are vital to flying fox health and survival. In turn, the health, movement and survival of many plant species and ecosystems are reliant on flying foxes.



CAMP RESTORATION AND SPECIES RECOVERY: ENHANCING HABITAT FOR THE GREY-HEADED FLYING-FOX IN BEGA

Hugh Pitty | Community Coordinator | Friends of Glebe Wetlands

The Glebe Wetlands is a highly significant camp for the Grey-headed flying-fox (GHFF), being one of only seven identified highpriority breeding sites in NSW, that has been monitored closely for the past nine years (2012-2021) – through regular monthly counts conducted by volunteers, contributing data to the NFFMP, sharing reports regionally and interstate. The Glebe Wetlands is a really important site with a unique history of low conflict... until recently.

Following education work initiated in 2015 through a successful Interpretive Signage Project, the Friends of Glebe Wetlands has since begun restoration work through an ongoing Habitat Enhancement Project commenced in 2017 with seed funding from the local Council's Community Environment Grants Program via the Far South Coast Landcare Association. With a vision to begin a gradual transition from exotics to native plant species, while preserving the habitat integrity for the Grey-headed flying-fox and numerous other species, the project established regular monthly working bees to collectively undertake project activities. These include removing weed species, planting and mulching areas, path construction, installing a bench seat, minor landscaping, an aquatic habitat assessment, and research and design of the transition to be done through: surveying remaining areas of extensive weed vegetation; development of a plan for gradual removal of weed species to enhance habitat for the threatened species Greyheaded flying-fox; and design of associated plantings.

Taking inspiration from origins of Bush Regeneration in Australia, to work gradually from areas of good to areas heavily infested with weeds, the project is also taking great care to preserve existing habitat and enhance available options for local wildlife by creating new habitat.

This presentation reviews progress achieved to date and lessons learnt so far, complications of working on a flood-prone site, and concludes by looking to the future through using a current campaign to grow the group invigorate the volunteers, diversify the range of activities to include educational events, and challenges us in thinking big and outside the box to plan for landscape approaches to species recovery.



PRESERVATION OF HERITAGE TREE ASSETS - DISPERSE OR NUDGE? COLAC BOTANICAL GARDENS GREY HEADED FLYING FOX CAMP MANAGEMENT

Cameron Duthie | Manager, Services and Operations | Colac Otway Shire

Mark Robinson

Daniel Roberts

Problem Statement

The Colac Botanic Gardens flying-fox camp is located on the southern aspect of Lake Colac in the Shire of Colac Otway, Victoria. The Colac Botanic Gardens are managed by Colac Otway Shire Council. The gardens are popular for locals and a primary destination for visitors coming to Colac. Land uses surrounding the gardens include a caravan park immediately to the east and established residential areas to the south and west. The camp was first formally recorded in December 2016. It has been intermittently occupied since that time. Whilst the number of flying-foxes has varied since initial occupation, numbers have reached up to 9,000 in early 2020.

The Gardens are listed on the Victorian Heritage Register. Trees of individual significance are listed in the Statement of Significance and some of these trees have become preferred roosting habitats. In general the flying-fox camp has had a significant impact on the amenity of the botanic gardens in terms of tree health, defecation and noise.

<u>Method</u>

In 2020 Colac Otway Shire obtained an ATCW to control the colony in line with the Colac Grey Headed Flying Fox Management Plan for the express purpose of dispersal of GHFF. In 2021 post consultation it was determined that nudging the colony within the perimeter of the gardens, was preferred in an attempt to preserve the longevity of heritage assets.

Proposition

The nudging program was designed to acknowledge the cohabitation of the colony and the community and encourage the flyingfoxes to relocate into trees that are located within the gardens that are more robust and able to house the colony in a more sustainable way.

The preferred location for this relocation was away from public assets within the gardens such as the playground and the BBQ area, thus improving the public amenity of this area and allowing the opportunity for our heritage trees to recover from the impacts of this habitation. Nudging activities undertaken in June 2021 were in accordance with the Colac Otway Grey Headed Flying Fox Management Plan (2018) and the supplied Application to Control Wildlife permit suppled to Colac Otway Shire from the Department of Environment, Land, Water & Planning (DELWP). The presentation is to provide an update on the outcome of the 2021 program and the findings.



NATIONAL FLYING-FOX MONITORING PROGRAMMING: 9 YEARS OF GREYHEADED FLYING-FOX POPULATION DATA

Adam McKeown | Research Officer | CSIRO

Eric Vanderduys | CSIRO Dr. Chris Pavey | Senior Research Scientist | CSIRO

Dr. David Westcott | Senior Principal Research Scientist | CSIRO

Monitoring is necessary for the management of any threatened species. It establishes baseline data for tracking trends in the distribution and abundance and is a key tool for management of threatened species. Despite conflict with humans and the threatened status of many flying-foxes (Pteropus), few species are being monitored. There are great challenges in monitoring them, most notably their high mobility and large and easily disturbed aggregations. Australian species mostly have massive distributions, often in remote locations, further complicating monitoring.

We present the results of nine years (2012-2021) of the National Flying-fox Monitoring Program (NFFMP). and discuss the short term impact of the widespread fires of late 2019 to early 2020 on the grey-headed flying-fox population.



PARALYSIS EVENT IN FLYING-FOXES IN QUEENSLAND AND NEW SOUTH WALES

Keren Cox-Witton | Senior Project Officer | Wildlife Health Australia

Anita Gordon | Principal Veterinarian, Pathology | Department of Agriculture and Fisheries

In December 2020, wildlife rehabilitators and veterinarians reported an unusual event in flying-foxes across a range of locations in NSW and South East Qld. A large number of black flying-foxes (Pteropus alecto) and little red flying-foxes (P. scapulatus) presented with neurological signs such as paralysis, protruding tongue, inability to swallow and respiratory difficulties, and some were found with the mouth filled with dirt or sand. Most were dehydrated but nutritional condition varied. Most affected bats died or were euthanased, although some of the milder cases recovered with supportive care.

With the assistance of wildlife rehabilitators and veterinarians, over 60 bats with neurological signs were submitted to the Biosecurity Sciences Laboratory (BSL) in Qld for investigation between December 2020 and February 2021. While some of these were found to be infected with Australian bat lyssavirus (ABLV), the majority were not, and ABLV is not considered to be the cause of the paralysis event. Histopathological examination of 16 affected bats did not identify the cause of the neurological signs, and botulism testing was negative. There was no evidence of ticks or tick bites, which ruled out tick paralysis as the cause.

There is no evidence of an infectious cause of this widespread disease event. The most likely explanation is a toxic or metabolic cause (e.g. plant toxin). Given how far flying-foxes travel between foraging and roost sites and the broad geographic range of this event, it is very difficult to determine where the bats were exposed and to identify the agent. The event continued into May 2021, but numbers of affected bats have significantly reduced over winter.

This event shows the importance of reporting disease events in bats and other wildlife. This presentation will provide information on what to look out for, when to report, and who to report to, and where to find resources on flying-fox health and disease.



FLYING-FOX ODOUR NEUTRALISING TRIAL

Jess Bracks | Principal Wildlife Biologist | Ecosure

Natalie Foster | Natural Resources – Flying Fox Officer | Eurobodalla Shire Council

Tyron de Kauwe | Natural Areas Conservation Officer | Sunshine Coast Regional Council

In November 2018, Ecosure assisted Eurobodalla Shire Council in developing the Eurobodalla Flying-fox Management Plan (the Plan). Extensive community engagement during development of the Plan identified odour impacts as the second most significant concern for people living or working near a flying-fox camp (after faecal drop/mess).

To better understand this impact and investigate potential mitigation, Ecosure partnered with Eurobodalla Shire Council, assisted by the NSW state government, to trial the use of odour neutralising systems as potential tools for helping address odour issues associated with flying-fox camps.

The project was split into two stages: a feasibility study and indoor/outdoor trials. The feasibility study identified the chemical nature of the odour and an appropriate neutralising compound, characteristics of an appropriate site for the trial, designing the trial (including methods for monitoring effectiveness, and signs of negative impacts on flying-foxes), and evaluating feasibility in terms of financial affordability, practicality, and risks of negative impacts on flying-foxes. The study concluded that the proposed odour neutralising system was financially feasible (although costs of installation and operation are not insignificant), practical (although community acceptance is not guaranteed, and may vary between sites), and unlikely to negatively impact flying-foxes.

The subsequent trial, assisted by Sunshine Coast Council, comprised investigation of systems to neutralise flying-fox odour in both indoor and outdoor environments:

- 1. Indoor system small, inexpensive Hostogel[™] pots with a gel-based neutralising formula to neutralise flying-fox odour in indoor environments.
- 2. Outdoor system misted or vapourised neutralising formula (QuickAir™0900V diffused via a VapourgardTM unit) to neutralise flying-fox odour in outdoor use areas.

In this presentation we will share results regarding the potential for these options to help alleviate odour concerns for communities near flying-fox camps.



A REPORT OF RARE CLUSTERS OF AUSTRALIAN BAT LYSSAVIRUS INFECTIONS IN QUEENSLAND

Dr. Janine Barrett | Principal Veterinarian (Surveillance) | Department of Agriculture and Fisheries

Clusters or 'outbreaks' of ABLV infections in bats are rare. Cases of Australian bat lyssavirus (ABLV) infection usually occur sporadically in individual bats. Virus sequencing indicates that the viruses that occur in bats of the same species, or in the same location, or at similar times, are usually no more related to each other than they are to those of other bats.

Since the discovery of ABLV in 1996, there have been two periods in which clusters of ABLV-infections in flying foxes have been detected in Queensland - the first in late spring of 2017, the second in the summer of 2020-21.

In November 2017, 11 Pteropus conspicillatus pre-fight pups were rescued in groups (Group 1 = 6 pups, Group 2 = 5 pups) from two separate locations in Far North Queensland. While in care the pups developed neurological signs consistent with ABLVinfection, and died over an 11-day period. Phylogenetic analysis indicated the virus sequences from within each pup group were identical or extremely similar, suggesting all the pups within each group had been infected by the same bat, with different bats infecting each group. We suspect that the pups in each group had been attacked and infected while they were in crèche at night. This study suggests pre-flight age pups are at risk of mass ABLV infection while neither protected by their dam, nor able to fly to escape.

In the five months from 1 December 2020 to 30 April 2021, an unprecedented number of ABLV infections (N = 18) were detected in flying foxes, principally little red flying foxes (LRFF), found in South East Queensland (SEQ). The incidence (detections/time, equivalent to 43 per year) was exceptionally high compared with what is usual for Queensland (Since 2000, between 0 and 14 ABLV incidents were detected per year in Queensland (95%, confidence interval 5.1 to 8.9). Whether this clustering in time was due an increase in the proportion of bats being infected (an 'outbreak') or was simply due to a large camp of LRFF having moved into the densely populated coastal area of SEQ, causing sick LRFF that would not normally be noticed to be found and submitted, is being investigated by sequencing.

This presentation will also include rare footage of ABLV infections in bats that have been recorded and generously shared by bat carers.



REVERSING THE PATHWAY TO EXTINCTION: THE SPECTACLED FLYING-FOX RECOVERY TEAM

Maree Treadwell-Kerr and Sera Steves | The Spectacled Flying-fox Recovery Team

The Spectacled Flying Fox Recovery team is the best hope for the survival of the species and our unique biodiversity of flora and fauna in FNQ. The team is made up of representatives from local, state, and Commonwealth governments as well as local and regional NRMs, traditional owners, advocacy groups and leading scientific experts, community leaders, and wildlife rehabilitators.

The Spectacled flying-fox (SFF) was listed as endangered in February 2019 after having been nominated for up-listing from vulnerable by the Humane Society (HSI) Australia in 2015 after monitoring showed a 50% decline in the Australian population. By the time the SFF was listed as endangered, 2017 monitoring had indicated a 75% population decline to around 80,000 animals, and the SFF had experienced its first mass mortality in a heat stress event in November 2018 with the loss of 23,000 individuals.

Despite the Commonwealth and Queensland up-listing, no new management or conservation actions were implemented. The 2010 Recovery Plan was due to expire in April 2021 and informal advice had indicated that the SFF was not a priority conservation species.

Following preliminary talks between Bats and Trees Society of Cairns (BatSoc) Inc and Cairns and Far North Environment Centre (CAFNEC) about redressing this, the Recovery Team was formed in late 2020 with interest from all 28 individuals and groups invited.

The primary aim of the Spectacled Flying Fox Recovery Team (SFFRT) is to coordinate the recovery of the SFF population including renewal and implementation of the Recovery Plan for the SFF.

We will report on our progress and outcomes to date, the challenges we face and our aspirations to ensure survival of the SFF and its vital ecological roles in a society that not only tolerates flying-foxes but celebrates them.



THE IMPACT OF HEAT STRESS EVENTS AND ELECTROCUTIONS ON JUVENILE GREY-HEADED FLYING-FOXES: ADELAIDE COLONY

Linda Collins | Fauna Rescue of South Australia Inc.

The Grey-headed Flying-fox arrived in Adelaide 2010. Less than 1,000 animals occupied the colony until 2014. Since June 2018 the colony now fluctuates between 20,000 and 30,000. The colony experienced its first heat stress event (HSE) January 2013 and first juvenile electrocution May 2014. Since January 2013 Adelaide has recorded 45 days of temperatures $\geq 40^{\circ}$ with 18 days resulting in fatalities. An estimated 16,000 animals have died and 790 rehabilitated. Approximately 85% of deaths have been juveniles. The number of juvenile electrocutions collected from January to May has increased from one in 2014, to ninety-five in 2021. The first animals requiring rehabilitation did not come into care until Adelaide's second HSE, December 2013, these were two surviving juveniles. A third HSE, January 2014, brought a further 14 juveniles into care and the Fauna Rescue SA Flying-fox Rescue Team (FRT) was established. The team currently has 48 active volunteers.

The FRT compiles detailed data on all animals received, monitors, and supports the colony during HSE's, processes deceased animals and records weather conditions impacting the colony during these events. The team conducts monthly fly-out counts and has developed an education program for Adelaide community groups and local government councils. To date, 80% of animals recorded by the FRT are those processed during HSE's. Of the remaining animals, 64% are electrocutions. Sixty percent (60%) of electrocutions are juveniles, 28% adults, 12% unknown.

This presentation illustrates the correlation between HSE's and juvenile electrocutions and how dates and locations of electrocutions can support SA Power Networks in reducing juvenile occurrences.



CORONAVIRUSES AND AUSTRALIAN BATS: NEW DATA AND A REVIEW IN THE MIDST OF A PANDEMIC

Dr. Alison Peel | ARC Discovery Early Career Researcher Award (DECRA) Research Fellow | Griffith University

Australia's 81 bat species play vital ecological and economic roles via suppression of insect pests and maintenance of native forests through pollination and seed dispersal. Bats also host a wide diversity of coronaviruses globally, including several viral species that are closely related to SARS-CoV-2 and other emergent human respiratory coronaviruses. Although there are hundreds of studies of bat coronaviruses globally, there are only three studies of bat coronaviruses in Australian bat species, and no systematic studies of drivers of shedding. These limited studies have identified two betacoronaviruses and seven alphacoronaviruses, but less than half of Australian species are included in these studies and further research is therefore needed. There is no current evidence of spillover of coronaviruses from bats to humans in Australia, either directly or indirectly via intermediate hosts. The limited available data are inadequate to determine whether this lack of evidence indicates that spillover does not occur or occurs but is undetected. Conversely, multiple international agencies have flagged the potential transmission of human coronaviruses (including SARS CoV-2) from humans to bats, and the consequent threat to bat conservation and human health. Australia has a long history of bat research across a broad range of ecological and associated disciplines, as well as expertise in viral spillover from bats. This strong foundation is an ideal platform for developing integrative approaches to understanding bat health and sustainable protection of human health.



EXPANDING OUR UNDERSTANDING OF GREY-HEADED FLYING-FOX MOVEMENT, FORAGING BEHAVIOUR, POPULATION, AND THREATS

Dr. Justin Welbergen | Western Sydney University

Dr. John Martin | Research Scientist | Taronga Conservation Society Australia

Dr. Jessica Meade | Postdoctoral Research Associate | Hawkesbury Institute for the Environment, Western Sydney University

Dr. Chris Turbill | Senior Lecturer in Animal Science, Life Sciences | Western Sydney University

Eliane D. McCarthy | PhD Candidate | The University of Sydney

Samantha Yabsley | Master of Research Student | Hawkesbury Institute for the Environment, University of Western Sydney Dr. Matthias Boer | Associate Professor | Hawkesbury Institute for the Environment, Western Sydney University