Pteropus, pestilence and politics – managing flying-foxes in an inane environment

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ABSTRACT

Flying-foxes generate polarised responses from the community: from those who are pro flying-foxes and their conservation to those who perceive the animals as disease-ridden pests that are in plague proportions and have no value. Much time is thus spent by wildlife managers in dealing with these perceptions rather than managing the real issues. In addition, there are still gaps in our ecological knowledge of flying-foxes, which need to be filled in order to better manage these animals.

This paper outlines a Commonwealth-funded, collaborative project involving universities, local councils and individuals that is being co-ordinated by Queensland Parks and Wildlife Service. The project aims to undertake actions to benefit the conservation of the four species of flying-fox found on mainland Australia: Grey-headed Flying-fox *Pteropus poliocephalus*, Spectacled Flying-fox *P. conspicillatus*, Black Flying-fox *P. alecto*, and Little red Flying-fox *P. scapulatus*, across the state of Queensland. The principal areas of work are: education, population monitoring, habitat use and mapping and roost site use.

Key words: *Pteropus* species, conservation, education, population monitoring, public relations

Introduction

Managing flying-fox camps is as challenging now as ever before but the expectations of the community have risen to an all time high. Flying-foxes seem to find urban roost sites more desirable than those in isolated areas and whilst we do not fully understand the reasons, we need to look to integrated information systems that can provide modelling data to assist us in undertaking more accurate assessments of the potential impacts of flying-foxes on communities.

Broad community support for the conservation of flying-foxes is virtually non-existent as falsehoods regarding the incidence of zoonotic diseases are perpetuated and fictionalised into folklore. Government agencies are forced, as a consequence, to deal with the perceptions of the community rather than managing the realities of the issue. Community education programs are ignored in favour of actions and retributions against either the flying-fox or the agency responsible for its management.

In addition to the abovementioned issues there are significant gaps in our knowledge of the ecology of the four Australian mainland species of flying-fox. To assist in the management of these species the Queensland Environmental Protection Agency has developed a project to undertake a program of public education and implement other strategies to benefit flying-fox conservation.

This paper outlines a collaborative project between universities, local councils and individuals that is being co-ordinated by Queensland Parks and Wildlife Service (QPWS). The project will run until June 2008. The following sections outline the different components of the project.

Education

A draft state-wide education strategy has been developed and a holistic approach is being adopted that incorporates a range of management tools to help protect flying-foxes and reduce negative interactions with people. The education program focuses on people affected by urban colonies and fruit growers who lose fruit to flying-foxes. A workshop is planned for educators both internal and external to QPWS, who have knowledge of and an interest in flying-foxes to review the education strategy. The review will work to ensure the actions to be implemented are realistic, achievable and effective.

The development of brochures and posters is often the initial response for addressing wildlife education issues and while there is a place for such tools they can be limiting and may not effectively reach the target audience. This workshop aims to provide an opportunity for brainstorming of creative and novel ideas for tools that maximise outcomes. Funding to implement priority actions has been allocated.

Monitoring

The Grey-headed Flying-fox is listed as vulnerable under the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to significant population declines and ongoing threats to their habitat (Department of the Environment and Water Resources 2007). Therefore, a reliable monitoring system is required to track population trends as well as to gauge the effectiveness of recovery actions. In Queensland, this migratory species regularly roosts in areas south from Turkey Beach (–24°04'43"S, 151°39'05"S) and has been the subject of formal fly-out count monitoring programs.

Pp. 357–360 in *The Biology and Conservation of Australasian Bats*, edited by Bradley Law, Peggy Eby, Daniel Lunney and Lindy Lumsden. Royal Zoological Society of NSW, Mosman, NSW, Australia. 2011.

Daytime camp counts have also been undertaken at a small number of colonies.

The Spectacled Flying-fox is also listed as vulnerable under the EPBC Act due to significant population declines and the loss of foraging habitat. Monitoring is an important tool for this species for the same reasons mentioned for the Grey-headed Flying-fox. The majority of Spectacled Flying-fox camps occur within the Wet Tropics bioregion of northern Queensland, with a cluster of camps on Cape York Peninsula. An ongoing monthly daytime count monitoring program of the Wet Tropics camps is undertaken by Commonwealth Scientific and Industrial Research Organisation (CSIRO).

The other two species found in Queensland, the Black Flying-fox and the Little Red Flying-fox are currently listed as least concern under both the EPBC Act and Queensland's *Nature Conservation Act 1992*. However, they are affected by the same threats as the Grey-headed Flying-fox. There has been no broad population monitoring of these two species and population data could assist in tracking trends in their populations as well as providing information on seasonal movements.

Fly-out counts

This method has proven to be the most effective for monitoring flying-fox numbers. It can be an appropriate method for undertaking counts of individual colonies. Errors are acceptable in scale and relatively predictable when trained and experienced observers are used (Westcott and McKeown 2004). However, under some conditions fly out counts produce inaccurate and imprecise estimates of abundance (Forsyth et al. 2006).

Significant logistical issues are associated with undertaking counts at multiple colonies across the large areas occupied by all four species of flying-fox. Fly-out counts require observers to be positioned at numerous vantage points where flying-foxes can be seen and counted as they fly out at dusk to commence foraging for the night. Due to the varying conditions under which counts are undertaken and inconsistencies in the methods used at different sites, fly-out counts are currently not providing results that are accurate or precise enough for monitoring short-term population trends.

Fly-out counts of Grey-headed Flying-foxes started in 1998 and were undertaken for seven years with the last count being done in 2005. In Queensland, fly-out counts were commenced in 2002, prior to this ground counts were undertaken by a single observer (Eby 2002). It has been suggested that annual fly-out counts for Grey-headed Flying-foxes should not be undertaken at present due to the huge effort required and the inaccuracy of counts (Birt 2005). Fly out counts undertaken in 2005 involved 370 volunteers and even with this level of support fly-out counts are not possible at all camps (Birt 2005).

Fly-out counts for Spectacled Flying-foxes also started in 1998 (Garnett et al. 1999) and were undertaken annually up to and including 2003.

Daytime camp counts

Estimating numbers based on animals seen (including extrapolation)

This method is an alternative to fly-out counts that has been used in counting animals seen at roost sites during the day. This method is problematic for large colonies and when animals are obscured by vegetation and other flying-foxes. In addition, not all camps are accessible for undertaking these counts. However, a single observer can assess several camps in a short period of time. Levels of precision and accuracy are low relative to fly-out counts, but day counts are logistically easier to undertake and provide useful indicative data.

There are a number of methods for undertaking daytime estimates and all have strengths and weaknesses.

- Direct counts of **all** animals in the roost – it is often not possible to see all the animals, which are can be obscured by vegetation or other animals.
- Extrapolation from counts at a sample of trees using the number of occupied trees – this can be problematic because different trees (of different sizes and species) will hold different numbers of animals.
- Extrapolation from sample quadrats to the occupied area.
- Distance sampling, which uses area occupied and point counts (with assumptions) to calculate densities. This method is more complex and requires more training, equipment and time but has the potential to provide more accurate estimates. Partial point transects have been identified as being the most efficient way of using this method for flying-fox roosts. This method provides a repeatable, precise and accurate way of estimating population numbers (Clancy and Einoder 2004). While distance sampling may provide accurate population estimates at roosts with easy access it will prove logistically difficult to undertake synchronous counts at all roosts. Also, the cost of multiple pieces of essential equipment is prohibitive (Laser distance measuring unit ≈ $500 up to 100M and ≈ $800 up to 300M.

We consider daytime counts as the preferred method for monitoring fluctuations in camp populations, given logistical and resource constraints. Although the results are not sufficiently precise or accurate to monitor trends, they are indicative of broad fluctuations. In the short-term this method provides an opportunity to collect useful population data on flying-foxes with available resources. It also provides an excellent opportunity for preparing staff and volunteers for any new counting method which may be developed, as identified in the draft recovery plan for the Grey-headed Flying-fox (Department of Environment, Climate Change and Water (NSW) 2009). Pople (2003) suggests that a combination of fly-out and daytime counts should be undertaken, depending on the attributes of the different roost sites.

Daytime counts also provide the opportunity to collect additional data that is useful for making management decisions including:

- presence or absence of species,
- identification of the species present in the camp,
- the proportion of different species occurring in mixed camps,

- presence of pregnant animals, animals carrying young or independent young, and
- attributes of roosting sites such as presence of weeds, proximity to human neighbours and levels of disturbance.

This data will assist in identifying roosting habitat critical to survival of flying-foxes as described in the draft recovery plan for Grey-headed Flying-foxes.

Quarterly daytime counts have been undertaken at a small number of colonies in south east Queensland. CSIRO has been undertaking monthly daytime counts of Spectacled Flying-fox colonies in far north Queensland for several years and is committed to continuing this program (pers. com. Louise Shilton CSIRO).

QPWS, with significant assistance from volunteers, is undertaking regular counts of known flying-fox camps. Data on seasonal distribution is being collected and this will add to our knowledge of migration, assist with ground-truthing of habitat models and detecting a decline or increase in area of occupancy (one of the criteria for assessing species for threatened species listing).

Recovery plan actions that relate to monitoring of flying-fox species

Draft national recovery plan for Grey-headed Flying-fox (Department of Environment, Climate Change and Water (NSW) 2009)

1. Review and improve methods used to assess the population size of the species.
2. Monitor population trends – conduct a range-wide assessment of population size at least once during this five-year recovery plan.

Draft recovery plan for Spectacled Flying-fox (Schulz and Thomson 2006)

1. Continue existing annual dusk fly-out counts – this is the only long-term census data available. The recovery plan details required improvements to the methodology including planning; inclusion of all camps; standardising participants; avoidance of double counting of animals; and investigation of incorporating replicate counts at all camps.

2 Continue current monthly daytime counts of camps.

Identification and mapping of essential foraging and roosting habitat

Satellite tracking

Satellite telemetry provides an excellent opportunity to obtain information on migration and habitat use of flying-foxes.

The main objectives of this component of the project are to:

- Provide detailed spatial and temporal information on movements across the range of Grey-headed Flying-fox;
- Investigate how the species utilises roosting and foraging habitat at both local and landscape scales;
- Identify seasonal and other temporal variations in use of roosting and feeding areas,
- Assess the availability of roosting and foraging habitat;
- Develop predictive criteria to identify alternative camp sites, and
- Determine appropriate management strategies for flying-fox camps in human-occupied areas.

This work is being done in collaboration with Griffith University and involves the use of satellite transmitters on Grey-headed Flying-foxes. The results will also assist in the habitat modelling project described below.

Habitat modelling

The objective of this component is to identify and map the extent of areas of habitat that are critical for the conservation of flying-foxes. The modelling will build on the ranking of feeding habitat of Grey-headed Flying-foxes created by Peggy Eby and Brad Law including foraging habitat and identification of critical habitat during bottlenecks in food availability (Eby and Law 2008). The process will involve the use of Bayesian belief network modelling and spatial and temporal modelling, including food production associated with rainfall. This information will then provide the basis for predicting movements of fly-foxes in relation to their use of urban camps. The main focus will be on Grey-headed Flying-foxes. However, a similar process for the other species of flying-foxes that occur across the state will be required.

Enhancing roost sites and developing alternative roost sites

Flying-foxes seem to find urban campsites more desirable than those in isolated areas. The presence of flying-foxes in urban areas can cause conflict with people living nearby, which in turn can lead to the legal or illegal disturbance of the animals. Often the disturbance is not successful, and if it is, there is a significant risk of the animals moving into a similar or worst situation. It is therefore important to have a better understanding of why flying-foxes utilise urban camp sites and develop ways of enhancing existing roost sites to keep animals at sites as well as developing new sites to lure animals away from problem sites. Trials, in collaboration with councils, are being undertaken to investigate these issues.

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