Submission to the House of Representatives Standing Committee on Environment and Energy inquiry

Flying-fox management in the eastern states

National Environmental Science Programme (NESP)
Threatened Species Recovery; Clean Air and Urban Landscapes Hubs

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Preamble

We appreciate the opportunity to make this submission to the House of Representatives Inquiry into management of eastern Australia's flying-foxes. There are four species of flying-fox which occupy Australia's east coast, two of which are listed as Vulnerable under the EPBC Act, and one of which (the grey-headed flying-fox) is found nowhere else in the world. Because of the complex and large-scale movements of these species, their habit of forming very large roosts in response to fluctuations in flowering a fruiting, and their increasingly urban nature, we recognise that the management of flying-foxes is fraught with challenges and is often the source of controversy. We also recognise that it is these features of their ecology which makes them such important dispersers of seeds and pollen for Australia's forests.

The National Environmental Science Programme (NESP) aims to assist decision-makers to understand, manage and conserve Australia's environment by funding world-class biodiversity and climate science. The Programme is being delivered across six research hubs. Two of these Hubs (the Threatened Species Recovery (TSR) and Clean Air and Urban Landscapes (CAUL) hubs) are undertaking research that relates to social and ecological questions relevant to flying-fox management; The TSR and CAUL hubs include scientists from across 11 institutions. We would be happy to provide further information or to answer queries relating to the information we have presented here should the committee wish for any clarification.

Executive summary

ToR1 – Listing and delisting

- The grey-headed flying-fox (GHFF) and spectacled flying-fox (SFF) are listed as Vulnerable under the EPBC Act (s. 179 (5)) on the basis of criterion 1: the species have undergone a substantial reduction in numbers.
- The best available evidence from the National Flying-fox Monitoring Program suggests that populations of GHFF have stabilised (but not recovered) while SFF continue to decline, though several more years of data are needed to ensure population estimates are robust.
- Threats which led to the decline and subsequent listing of GHFF and SFF (habitat loss, extreme climatic events and persecution) persist today and have the potential to accelerate in the near future due to policy changes, climate change, and social tensions surrounding flying-fox roosts.

ToR2 – Regulatory frameworks

- Currently, there are inconsistencies between the listing criteria and processes used by governments of individual states and the Commonwealth, which hampers attempts to manage broad-ranging but threatened species across state borders.
- This should be addressed in part by the currently developing common assessment process, though there is likely to still be some inconsistency due to individual states and councils having their own flying-fox roost camp policies and management plans.

ToR3 – Regional-scale approaches

- Highly-mobile migratory and nomadic species are characteristic of Australia's unpredictable ecosystems, and present a unique set of conservation challenges. Historic and ongoing vegetation loss is the major cause of the current threatened status of these species, and is likely to continue to detrimentally affect their conservation outlook.
- Management interventions applied at the local scale have great potential to have both flow-on and cumulative effects on the spatial distribution of flying-fox roosts across the species' range.
- The establishment of a national register of management interventions and more stringent conditions relating to post-dispersal monitoring would allow for the tracking and assessment of these impacts and the effectiveness of management options.

ToR4 – Streamlining regulation

- There is little evidence for duplication of assessments between the states and the Commonwealth, however to avoid administrative duplication it would be sensible to have a single point of contact for flying-fox management applications that trigger the EPBC Act.
- Available evidence indicates that environmental standards in the states lag behind those of the Commonwealth. No state or territory biodiversity or planning laws are up to the federal standard necessary to effectively and efficiently protect MNES.
- The best way to 'streamline' without eroding environmental protections would be to channel more efforts into regional planning and strategic assessments of flying-fox roosts and foraging habitat, which would mitigate the cumulative impacts of individual projects.

ToR5 – Management success

- There is evidence that dispersals are costly, can require years of ongoing maintenance noise, are often unsuccessful.
- When the flying-foxes are forced to leave a roost due to management intervention, their groups often end up splintered into many smaller scattered roosts in locations that may have even greater social impacts than the original roost site.
- Preliminary results from our study of management effectiveness suggest that decisions to disperse are often driven by a vocal minority. Forced dispersals take a toll on local managers, who would prefer to focus on education, outreach, and less extreme forms of intervention.
- Like many human-wildlife conflict (HWC) scenarios, the issues surrounding management of flying-fox camps are primarily social, not ecological. Lessons on how to manage this can be drawn from the substantial HWC literature.

ToR 1. The circumstances and process by which flying-foxes are listed and delisted as threatened species at both the state and Commonwealth levels

Listing criteria and processes

The process for listing and de-listing species as threatened at Commonwealth and state/territory levels is transparent, robust, and objective, and includes considerable opportunity for public comment. It is clearly defined in the EPBC Act (ss. 178-179) and based on well-established international best practice (the IUCN guidelines, IUCN 2001). For the Commonwealth process, recommended assessment relative to those guidelines is undertaken by an independent panel of experts (the Threatened Species Scientific Committee) based on careful assessment of all available information, with targeted input sought from all relevant experts on the species.

Three of Australia's eight flying-foxes (*Pteropus, Dobsonia* species) are listed as threatened under the EPBC Act. The Christmas Island flying-fox *Pteropus (melanotus) natalis* is restricted to Christmas Island and is considered Critically Endangered, with a total population of ca. 1,000-2,000 individuals. The spectacled flying-fox *Pteropus conspicillatus* occurs in north-eastern Queensland and New Guinea, and in Australia is listed as Vulnerable. The grey-headed flying-fox *Pteropus poliocephalus* is endemic and restricted to eastern Australia, and is listed as Vulnerable under the EPBC Act and likewise listed as Vulnerable globally (by the IUCN).

There is an international context to the conservation of Australia's flying-foxes. The conservation status of flying-foxes is a global concern, with an unusually high rate of extinction and endangerment in this group: as recognised by the IUCN, of the 62 *Pteropus* species in the world, four are now extinct, 30 are threatened, eight are Near Threatened, eight are Data Deficient, and only 12 are considered Least Concern. This disproportionate rate of decline indicates that this group is highly susceptible to a suite of current threats, notably including habitat loss and persecution.

There are five criteria under which species may be listed as threatened, with qualification thresholds for each criterion explicitly set by the IUCN and under the EPBC Act (Environment Protection and Biodiversity Conservation Regulations 2000: Statutory Rules 2000. No. 181 as amended). The Grey-headed and Spectacled flying-foxes clearly do not meet four of those criteria. The key criterion for listing the grey-headed flying-fox and spectacled flying-fox as threatened (as for many other species) relates to population decline (criterion 1). In essence, to be eligible for listing as threatened, the species must have declined by at least 30% in population size over a period of 3 generations or 10 years, whichever is longer. Declines of 30-50% for this period qualify the species as Vulnerable, of 50-80% as Endangered, and of >80% as Critically Endangered. To assess any species against this criterion, it is necessary to know (or estimate) the generational length and population trends. The generational length for flying-foxes is reasonably well evidenced, at ca. 6-8 years – so the relevant time-frame for assessment of population decline is 18-24 years. The evidence base for population decline needs to be carefully interpreted from all available data.

Circumstances surrounding listing

The grey-headed flying-fox (GHFF) and spectacled flying-fox (SFF) have both exhibited long-standing historical declines, due largely to broad-scale clearing, culling, persecution, and other factors (Ratcliffe 1932; Garnett *et al.* 1999; Parry-Jones 2000; Eby 2000). Determining population size and trends for flying-foxes is especially challenging. Both SFF and GHFF are distributed patchily over tens of thousands of square kilometres. They congregate at roost sites, but population size at these varies substantially throughout the year, the location of roost sites shift, not all roost sites are known, and it is difficult for observers to reliably count the number of individuals at any roost site (Westcott *et al.* 2015). Nationally coordinated monitoring programs for both species have been attempted over the last decade, with results indicating either ongoing decline (SFF) or population stabilisation (GHFF) following previous decline, though there are caveats relating to the precision and accuracy of these estimates (Westcott *et al.* 2015). Additional information on population trends is also available for the

grey-headed flying-fox through recent analyses of demographic structure (Divljan 2008; McIlwee and Martin 2002), with this evidence further suggesting substantial population decline.

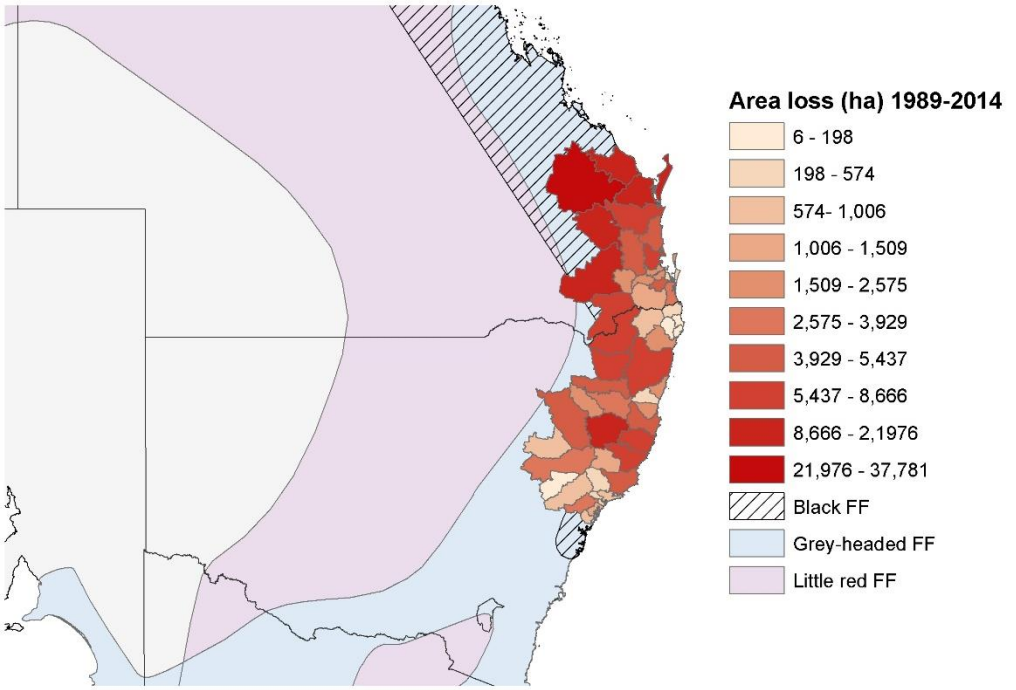
Process for delisting and persistent threats

The threats which led to the decline of grey-headed and spectacled flying-foxes were initially observed by Frances Ratcliffe in the 1930's (Ratcliffe 1932) and persist today. Listing under the Act has afforded flying-foxes some formal protection from some key threats, namely persecution, culling, and liberal application of dispersal interventions. The EPBC Act specifies the process for consideration of removing species from the list of currently accepted threatened species (s 186 (2A,B)). Species can be delisted where the available evidence demonstrates that the species no longer meets relevant listing criteria and where the current inclusion of the species on the list does not contribute to the survival of the species. The listing of the SFF and GHFF is currently contributing to the survival of these species, as it constrains some destructive management actions. Hence, the process of delisting could readily lead to further declines, particularly given the contentious nature of some of the larger roosts, and the species' long life spans and low reproductive output.

Both species have dietary requirements that can be met only by extensive dispersal to track spatially variable flowering and fruiting events (Parsons *et al.* 2006; Richards 1990; Eby 1991, 1998), which have become constrained by decades of vegetation clearing across much of their preferred habitats and particularly lowland coastal forests which form critical habitat for feeding over winter. Analyses presented by Evans (2016) indicate that across 51 local government areas in north coast NSW and south-eastern QLD, 243,000 ha of primary forest was lost due to human intervention in the period spanning 1989-2014 (Figure 1). Habitat destruction is still occurring across the entire range of GHFF and SFF and is anticipated to accelerate across areas of coastal northern NSW in particular, with changes to vegetation regulations and intense pressure from urban and extractive developments. This large-scale loss of preferred habitat has forced flying-foxes to aggregate in remnant habitats and or largely-modified areas where management may enhance food supply or habitat (such as orchards, botanic gardens and well-vegetated suburban areas (Tait *et al.* 2014; Williams *et al.* 2006). This leads to aggregations of flying-foxes in close proximity to human settlements and in numbers that may provide a misleading image of their total abundance (Eby and Lunney 2002).

All flying-fox species also continue to be impacted by occasional extreme heat events and particularly on days when temperatures exceed 42°C. A study by Welbergen et al. (2008) showed that between 1994 and 2008 at least 30,000 flying-foxes perished as a result of very hot temperatures, followed by approximately 5,000 deaths during the 2009 Black Saturday events, and 10,000 in 2013. Another heat wave during the summer of 2014 is estimated to have caused the death of a further 45,500 flying-foxes (Welbergen *et al.* 2014). The frequency of these extreme heat events is expected to continue to increase in coming decades as a result of ongoing climate change. In addition to this, tropical cyclones such as Yasi (2011) and Larry (2006) have caused direct mortality to and habitat loss for the spectacled flying-fox, and have been implicated in the ongoing decline of this species (Westcott *et al.* 2015). While predictions of these events are less robust, they are also expected to increase in intensity due to climate change (Walsh *et al.* 2000).

a)



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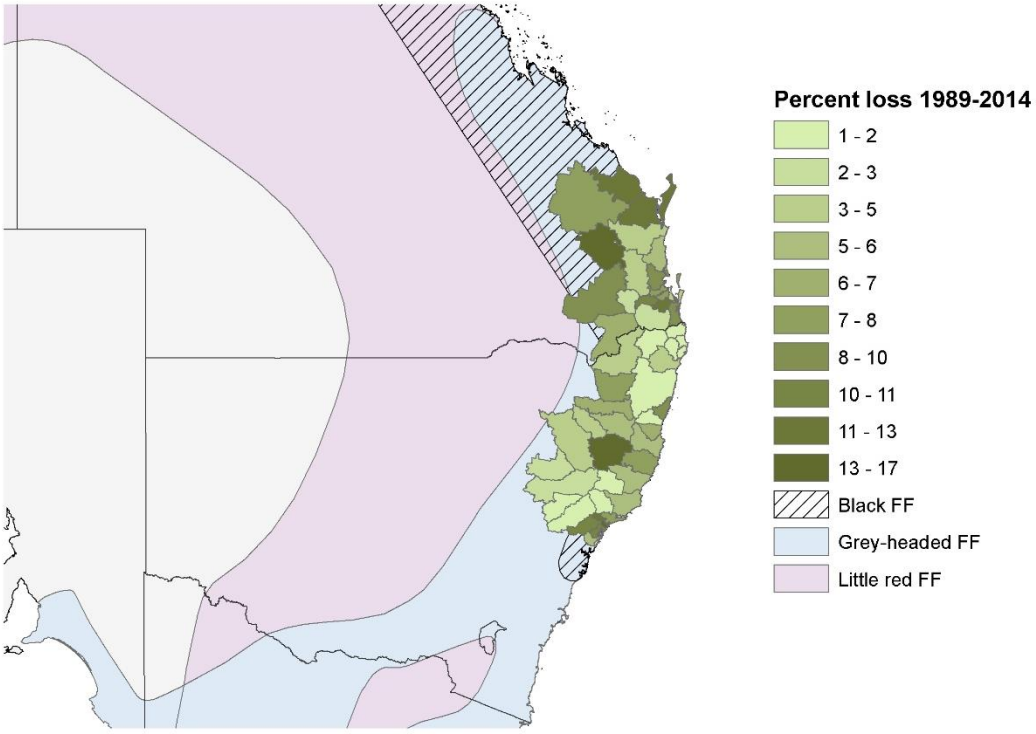

Figure 1 – Area (a) and percent (b) loss of primary forest along Australia's east coast due to human intervention 1989-2014. Data aggregated into Local Government Areas which support important feeding and roosting habitats for flying foxes which are threatened by ongoing clearing. Data were derived from the Australian Department of the Environment's "Human induced forest extent & change" (vers 11) layer, and were prepared and presented in Evans (2016).

ToR 2. The interaction between the state and Commonwealth regulatory frameworks

National coordination of actions for the conservation of biodiversity in Australia has been somewhat hamstrung to date by the development and operation of separate lists of threatened species (and inconsistent listing criteria) for every jurisdiction. Because of this, a species may be listed as threatened in one state but not listed in that part of its range over the border into another state. This is certainly the case for the grey-headed flying-fox, which is not listed in Queensland or the ACT but is listed as Rare in South Australia, Threatened (Vulnerable) in Victoria and Vulnerable in NSW. To some extent, this inconsistency is now being addressed through the common assessment process, which seeks to develop an integrated national listing of threatened species that is consistent at Commonwealth and state/territory level. All states are required to comply with EBPC referrals and assessment processes when managing nationally significant camps containing the EPBC listed species (Commonwealth of Australia, 2015). However, each state, not to mention local government areas and in some cases individual camps have their own sets of policies, strategic guidelines, management plans, and other regulatory frameworks that dictate what management interventions can and cannot be considered.

ToR 3. Strategic approaches to managing species at a regional scale

Australia's highly mobile fauna

Protection of those threatened plant and animal species that are sedentary and occur in a relatively small area is relatively straightforward. However, a feature of Australian ecology is that very many species are highly dispersive, because rainfall conditions, fire incidence and other factors force them to track spatially-variable food resources (Griffioen and Clarke 2002). Again, largely because of idiosyncrasies or the Australian climate, many of these resources ebb and flow in an erratic manner. There are very formidable conservation management problems for species that are highly dispersive, and especially those whose dispersal patterns are highly irregular (Runge *et al.* 2014).

The main conservation concern for such species is loss of habitat and loss of connectivity between remaining habitat patches. As a consequence of such broad-scale loss of habitat, many of Australia's highly dispersive species are now endangered: these include the swift parrot, regent honeyeater and orange-bellied parrot. The flying-foxes face comparable landscape-scale conservation challenges. Aside from clearing of habitat, forced dispersal actions which serve to exclude flying-foxes from otherwise suitable areas also have the effect of reducing habitat available to these species. Both loss and exclusion have the potential to drive flying-foxes into new areas, leading to the establishment of roosts in peri-urban and urban areas where temperatures and food resources may be suboptimal but nonetheless stable (Parris and Hazell 2005; Williams *et al.* 2006; Parry-Jones *et al.* 2016).

The need for a management register and monitoring

These issues have lead to a push from communities and local government bodies alike for the establishment of state-level or national registers of management interventions at flying-fox roosts. Such a register would allow for more ready assessment of some of the potential negative flow-on effects of these interventions from one area to another, as well as cumulative impacts resulting from the concentration of intervention in particular areas (EIANZ 2016). In addition to this, it is clear that monitoring needs to be more regularly and systematically implemented as a condition of dispersals, in order to assess how flying-foxes were impacted, where they went, and how dispersal affects the long-term spatial distribution of roosts.

ToR 4. Opportunities to streamline the regulation of flying-fox management

Duplication in assessments and applications

For this ToR we refer to the issues raised in the HoR inquiry into "streamlining environmental regulation" (2014). One of the ToRs for this inquiry related to avoiding duplication of assessment between the states and the Commonwealth through better coordination, which may be perceived to be applicable to the issues of flying-fox management. We wish to highlight here that the EPBC Act is very rarely invoked: compared with the high volume of development applications that are processed by local, state and territory governments (approx 250,000 per year, unfortunately we do not have figures specific to flying-fox management), relatively few are assessed under the EPBC Act (approx 400 per year). Of those, more than 75% of projects are decided within weeks (McGrath 2013). Moreover, the role of the Commonwealth in assessing MNES does not duplicate assessment and approval processes of the states, which do not evaluate MNES.

However, to avoid administrative duplication it would be sensible to have a single point of contact for applications that significantly impact on GHFF and SFF and trigger the EPBC Act, rather than lodging them at both the state and federal level. By strengthening the coordination between state agencies and the Commonwealth and establishing a register of management interventions (see above, ToR 3), the states could handle the administration of applications. This would involve referral to the federal government for assessment and approval on behalf of the proponent, and provision of a single set of approval conditions. If this approach is taken, improved coordination and communication between the states and the Commonwealth will be critical. The challenge of achieving effective coordination should not be underestimated, as the Hawke review (2009) has found that: "the main issue with the assessment bilateral agreements is the breakdown in relations between state and territory agencies and Commonwealth assessors."

Environmental standards

We also wish to stress that on the available evidence, environmental standards in the states lag behind those of the Commonwealth. An analysis of the threatened species and planning laws of all jurisdictions by the Australian Network of Environmental Defender's Offices (ANEDO December 2012) found that no state or territory biodiversity or planning laws were up to the federal standard necessary to effectively and efficiently protect the environment, as evidenced by the "as-of-right" policy currently adopted for urban flying-foxes in Queensland. In general, there is very little auditing of compliance with approval conditions in all jurisdictions (ANEDO December 2012). The Hawke Review (2009) called for an increase in environmental performance audits and inquiries, and the imperative for more auditing increases with any reduction of federal oversight. We would add to this the need for improved monitoring of outcomes of flying-fox management interventions that trigger assessment under the EPBC Act (see ToR 3 above).

Strategic assessments

Given the minimal duplication in assessment, and the critical importance of retaining federal checks and balances, it appears that the best way to 'streamline' without eroding environmental protections is to channel more effort into strategic assessment. Regional planning and strategic assessments (if done well) strike the balance between regulatory burdens and environmental benefits (e.g. Kujala *et al.* 2015). They streamline processes by identifying classes of approved actions that fit within a long term, regional strategy where management activities are balanced against initiatives that can genuinely produce measurable improvements in environmental outcomes. By taking a long-term, comprehensive view, strategic assessments can mitigate the cumulative impacts of individual projects that can lead to 'death by a thousand cuts'. This can foster more coherent planning for landscape connectivity and biodiversity conservation whilst also reducing assessment costs for individual proponents.

ToR 5. The success or otherwise of management actions, such as dispersal of problematic flying-fox camps.

Forced dispersals

Both anecdotal and published evidence suggests that forced dispersals are costly, can require years of ongoing maintenance noise, are often unsuccessful, and when the flying-foxes do leave the target roost they end up splintered into many smaller scattered roosts or in locations that may have even greater social impacts (Roberts *et al.* 2011; Eby and Roberts 2013). Essentially, the actions are simply 'kicking the can' - providing some perceived social benefit to one community at the expense of another. The reason that forced dispersals are rarely successful is that individuals of GHFF and SFF move readily and regularly between camps across their entire distributions – there is no 'local population' as such to disperse (Eby 1991; Shilton *et al.* 2008). This means that bats naïve to ongoing dispersal actions are constantly arriving at camps (Welbergen and Eby 2016).

Those forced dispersal projects that are considered to have been the most successful – notably those that took place at the Royal Botanic Gardens in Sydney and then in Melbourne – cost an estimated $1.5 million and $3 million respectively. Although the Melbourne flying-foxes left the Botanic gardens, they did not settle in their intended target roost in Ivanhoe in spite of many months of effort by the dispersers, instead choosing Yarra Bend park in Kew (R. van der Ree pers comm). While this area has few surrounding residents to complain, it is also much more exposed than the fern gully at the Botanic gardens where the bats were moved from and where an extreme heat die-off was never recorded. At Yarra Bend there has been at least such one extreme heat event in which ~10,000 bats perished (P. Lentini pers. obs.)

Perspective of local government managers

The University of Melbourne is currently conducting a social study of the effectiveness of different management approaches used at flying-fox roosts, with a focus on contentious urban roosts. This work is being led by Ms. Kaye Currey, a Master of the Environment candidate under the supervision of Dr. Pia Lentini, Dr. Dave Kendal, and Assoc. Professor Rodney van der Ree. At the time of the submission, Ms Currey has conducted 15 semi-structured interviews with local government managers from Victoria, New South Wales and Queensland about past management of roosts in their region. As the next step in her research, Ms. Currey will be sending out a quantitative survey to as many local government managers as possible to address the very question posed by this ToR.

While we do not yet have the full set of survey data from this study, some key patterns have emerged from the semi-structured interviews which are pertinent to this enquiry. For the most part, local council managers prefer to avoid using forced dispersal if they can. This is because the process is costly, time-consuming, takes a physical and emotional toll on the dispersers, and the outcomes are highly uncertain. Local managers expressed anxiety over where the bats would establish roosts next and were concerned the council would be liable for any impacts caused as a result of splinter groups forming in other locations.

In many instances local council managers felt that the majority of the pressure to disperse camps was coming from a handful of very vocal stakeholders who may be politically influential, but that the rest of the community were potentially quite responsive to education and outreach programs or less extreme forms of management such as vegetation management, provision of pressure washers etc. Those in Queensland, where they have an "as-of-right" policy that allows councils to manage roosts as they see fit in urban areas (within guidelines), felt that the introduction of the policy had greatly increased pressure on them from the community to impose forced dispersal before properly considering the alternatives. The interviews also revealed that many managers were unable to say whether their attempts at dispersal were "successful". They often suspected that at the time of the intervention local flower or fruit resources had started to become depleted and bats were ready to move on anyway,

irrespective of their actions. This might give the community a false sense of security that the problem had been permanently solved, when in fact the bats will re-establish in the next flowering event.

Human-wildlife conflict as a social, not ecological issue

As a final point, we would like to emphasise that the issue of contentious flying-fox management shares a great deal of similarities with other cases of human-wildlife conflict from around the world, such as crop-raiding elephants and wolf predation of livestock (Woodroffe *et al.* 2005). There is a vast literature on this subject covering decades of research, which provides a robust foundation for the issue of concern to your inquiry (Redpath *et al.* 2013). Some key messages and findings are that human-wildlife conflict is not a problem which ecological research alone will solve: in most cases it is conflict between different sets of human stakeholders with competing values (Manfredo and Dayer 2004; Peterson *et al.* 2010). In these situations, perceptions of risk are often not proportional to actual risk or damage: for example many community members may cite concern about disease transmission as the reason to want to forcibly disperse a roost even though the actual risk is extremely low (Dickman 2010). Although cases of conflict with the same species but in different locations will have similarities, it is critical to give local stakeholders the opportunity to be heard in each individual case to ensure that the real root of the problem and source of concerns is explored. Context-specific consideration of the situation is critical, and attempts to streamline regulation and management will overlook many of these critical nuances.

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