

Why NSW should ban the shooting of flying-foxes



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Title: Why NSW should ban the shooting of flying-foxes for crop protection

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Contents

The Flying-Fox Declaration	1
Introduction	4
Shooting for crop protection	6
The Queensland decision	8
Conservation reasons to ban shooting	10
Welfare reasons to ban shooting	13
Health reasons to ban shooting	17
Legal reasons to ban shooting	18
Options and support for growers	21
Conclusion	23
Endnotes	24

The Flying-Fox Declaration

We, the following 58 groups, call on the NSW government to immediately cease issuing licences for the shooting of flying-foxes as a method of fruit crop protection.

The shooting of flying-foxes undermines their conservation and recovery, and is inhumane.

There are sound legal reasons to cease issuing licences.

We ask the government to assist growers to adopt non-lethal methods of crop protection.

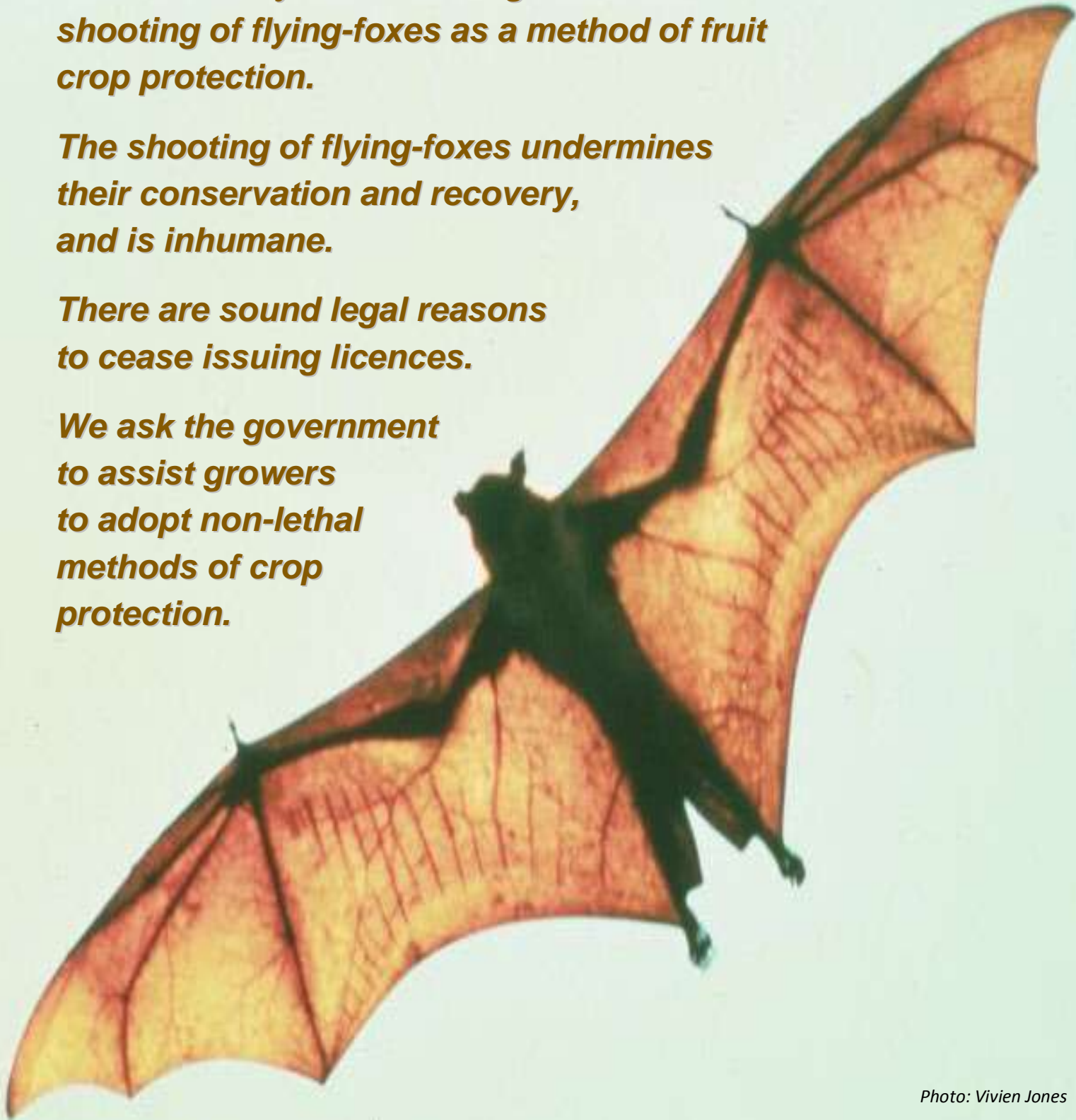


Photo: Vivien Jones



**Australian
Fauna Care**



**Ipswich Koala Protection Society
Inc.**



**Ku-ring-gai Bat
Conservation Society Inc.**





Wet Tropics Wildlife Rescue (Daintree) Inc.



Wildlife Carers Network



Introduction

The 58 groups endorsing this report call on the NSW government to stop issuing licences for the shooting of flying-foxes as a method of crop protection. In this report we present strong conservation, welfare, human health and legal reasons to do so.

Most of the flying-foxes shot under licence are Grey-headed flying-foxes (*Pteropus poliocephalus*). They are listed under state and federal laws as a threatened species, as 'vulnerable'. Black flying-foxes (*P. alecto*) and Little red flying-foxes (*P. scapulatus*) are also sometimes shot in NSW orchards.



There are three species of flying-foxes in NSW: Grey-headed flying-foxes (*Pteropus poliocephalus*) (left), Black flying-foxes (*P. alecto*) (middle) and Little red flying-foxes (*P. scapulatus*) (right).

Photos: Halley Design

In this report we justify the following reasons for the government to stop issuing licences to shoot flying-foxes as a method of crop protection:

1. Shooting undermines the conservation and population recovery of flying-foxes:

Grey-headed flying-foxes are listed as vulnerable, in part due to mortality in orchards.

Flying-foxes shot under licence contribute to a high rate of human-caused mortality of Grey-headed flying-foxes and continued population decline towards extinction.

The majority of flying-foxes shot in spring are breeding females, which contribute most to population growth.

Numbers of flying-foxes shot illegally are likely to be considerably higher than those shot legally, and this is facilitated by licensing growers to shoot small numbers.

Conservation is also compromised indirectly by the state condoning the killing of threatened species and using conservation resources to facilitate and regulate it.

2. Shooting undermines biodiversity conservation:

As long-range pollinators and seed dispersers for native trees, flying-foxes are keystone species, and their conservation is vital for the health of diverse ecosystems

With climate change, flying-foxes will become increasingly important in maintaining gene flow within plant species to facilitate adaptation to different climate patterns.

Current rates of mortality will render flying-foxes functionally extinct within a few decades (prior to species extinction), and undermine the conservation of native plants and the wildlife that relies on them.

3. Shooting for crop protection is inhumane

A significant proportion of flying-foxes shot in orchards would die slowly and painfully of their wounds rather than be killed instantly. A recent assessment of 155 flying foxes retrieved from NSW orchards (dead or wounded and requiring euthanasia) found that only eight (5%) had been shot in the head. Autopsies of 30 euthanased flying-foxes revealed “severe injuries, including multiple compound fractures to bones, ... that led to incapacitation but not death”.

Because the fruit season coincides with the breeding season of flying-foxes, the death of any lactating female will result in the death by starvation of her dependent young. About 40% of the 155 shot flying-foxes examined were lactating.

The Queensland Animal Welfare Advisory Committee has found that the shooting of flying-foxes for crop protection is inhumane.

4. Shooting for crop protection may increase public health risks

There is mounting evidence that subjecting flying-foxes to environmental stresses, such as shooting, increases the incidence of zoonotic virus infections in flying-foxes, which may increase the risk of spillover to other species.

5. Shooting for crop protection may breach state conservation and welfare legislation

By allowing the killing of a threatened species in decline the Department of Environment and Climate Change is failing to meet its legislative obligations to “prevent the extinction and promote the recovery of threatened species, populations and ecological communities, and to eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities.”

Those who shoot or facilitate the shooting of flying-foxes may be in breach of welfare legislation that prohibits cruelty to animals.

Shooting for crop protection

HISTORY

Ever since European colonists planted fruit crops in Australia, there have been complaints about flying-foxes decimating fruit crops. This is not surprising, as orchards represent a concentrated and accessible source of food for flying-foxes, rendered even more attractive as more and more of their native food trees have been cleared.

The current killing approach to crop protection in Australia has a long history. In 1929, biologist Francis Ratcliffe was brought from England to investigate the 'flying-fox problem'. He noted in his report after a two-year investigation that the object of most orchardists suffering damage was for the most part "to kill as many flying-foxes as possible", and he documented the variety of ways by which destruction was attempted:

Shooting – "expensive and ineffective"

Strychnine poisoning in orchards – "partially successful"

Poison gases (chlorine, hydrogen cyanide) in flying-fox camps – ineffective

Introduction of an infectious disease – unsuccessful

Explosives – "complete failures" ¹

However, Ratcliffe concluded that the "assumption that the flying-fox is a menace to the commercial fruit industry of Australia is quite definitely false, and cannot be cited as a valid reason for the expenditure of public money on its control."

Until as recently as 1986, fruit-growers could kill as many flying-foxes as they pleased, and shooting was the main method of crop protection.

In 1986 (see timeline), flying-foxes were finally given the legal protection accorded to other native mammals. Fruit-growers were then required to obtain a licence to shoot flying-foxes, which limited the numbers that could be legally killed. Between 1986 and 1992, a total of 616 licences were issued in NSW permitting the shooting of 240,216 flying-foxes. However, in one study, 69% of orchardists reported shooting flying-foxes without a licence, suggesting that much larger numbers of flying-foxes were killed illegally.²

When Grey-headed flying-foxes were listed as threatened in 2001, the numbers that could be killed under licence were further limited. However, there is no objective measure of the number of animals actually shot since the listing.

Timeline

1929 A biologist is brought from England to solve 'the flying-fox problem', but concludes that there is not a major problem. He reports that shooting is ineffective for crop protection.

1986 Flying-foxes are protected for the first time as a native mammal under NSW legislation; a licence is required to harm flying-foxes.

1986-1992 More than 240,000 flying-foxes are shot under licence in NSW orchards; many more are shot illegally.

1997 A moratorium on harming flying-foxes for crop protection is implemented for one season.

1998 The NPWS Policy on Flying-fox and Mitigation of Commercial Crop Damage is developed.

2001 Grey-headed flying-foxes are listed in NSW and federally as threatened species (vulnerable).

2001 The NPWS Director General makes a commitment that licensed killing of the Grey-headed flying-fox will be phased out over 3 years. This does not occur.

2002 A joint state-federal quota to limit the numbers of Grey-headed flying-foxes shot under licence to 1.5% of the national population estimate (0.95% is NSW's share of the quota) is agreed upon.

2008 The Queensland government announces that no more damage mitigation permits to kill flying-foxes will be issued because it is inhumane.

CURRENT SITUATION

Species shot: Most flying-foxes (more than 90%) shot under licence in orchards are Grey-headed flying-foxes. Little red and Black flying-foxes are also shot.

Crops affected: Stone fruit, mangoes, lychees, apples, pears, pawpaws, coffee and bananas are the crops most often affected.³

Numbers of licences issued: Only a small proportion of fruit-growers are significantly affected by flying-foxes. There are more than 2000 commercial establishments in NSW growing fruit attractive to flying-foxes, but a maximum of 92 licences to shoot flying-foxes have been issued in any one year.⁴ In recent years, only about 30-40 growers have applied for licences to shoot flying-foxes (see table page 9).

Orchards involved: Most licences issued are for orchards in the Central District, on the outskirts of Sydney in Central Coast Hunter Range, Sydney North, Sydney South and Blue Mountains regions. They are mostly small orchards in semi-urban areas. In 2005-2006 orchard size averaged 11 ha (ranging from 4-49 ha).⁵ Orchards do not have to be well managed or commercially viable to obtain a licence.

Timing of shooting: Most licences are issued between September and June to coincide with the ripening and harvesting of fruit. The peak of the fruit season coincides with Grey-headed and Black flying-foxes giving birth.

Current legislation: Licences to shoot flying-foxes are issued under s121 of the *National Parks and Wildlife Act 1974*.

Current policy: According to the current DECC Policy for the mitigation of damage to commercial fruit crops by flying-foxes.⁶

As a final alternative, the DEC [now DECC] will issue licences to property owners to harm a limited number of flying-foxes by shooting only. These licences are issued with the understanding that the farmer will shoot to scare and that some incidental harm is likely to result from this activity. That harm is not to exceed the specified limit of the licence.

Therefore, according to this policy, all flying-foxes legally killed in NSW are 'incidentally' (and therefore unintentionally) killed.

From 2002-2007, a federally negotiated quota allowed for about 3000 Grey-headed flying-foxes to be shot annually under licence. Individual growers were issued with a licence to shoot a maximum of 50 flying-foxes.

NON-LETHAL METHODS OF CROP PROTECTION

In its policy, the DECC "advocates that full exclusion netting is the only reliable method for protecting fruit crops from damage by flying-foxes."⁷ Where netting is not feasible the DECC suggests that using a variety of deterrents may be useful (see page 22).

A large proportion of NSW growers now use netting. However, the extent of the uptake is unknown. In its 2001-2002 review, the DECC cited a Department of Agriculture officer who estimated that 80-95% of stone fruit and lychee growers in northern NSW and southern Queensland had fully or partially netted their orchards.⁸

The Queensland decision

In June 2005, the Queensland Animal Welfare Advisory Committee (AWAC) agreed to an application by Queensland Conservation to assess whether the shooting of flying-foxes in fruit orchards for crop protection is humane.

The AWAC is a government-appointed advisory body to the Minister for Primary Industries. It includes representatives from the RSPCA, the veterinary profession, welfare NGOs, and agricultural industries. All decisions are arrived at by consensus.

The AWAC commissioned a review by their research officer, and invited submissions and presentations from various stakeholders, including representative bodies for fruit-growers. In late 2007, the AWAC provided the Minister for Primary Industries with the following advice:

“The Committee considers that the shooting of flying-foxes to control predation in the fruit crop industry is inhumane.”⁹

Under the Queensland *Nature Conservation Act 1992*, it is required that the Chief Executive be satisfied that methods for taking wildlife for damage mitigation are humane. Provided with the advice from the AWAC that shooting flying-foxes in orchards was not humane, the Minister for Climate Change, Sustainability and Innovation, the Honourable Andrew McNamara, announced on 25 May 2008 that after 1 September 2008 the EPA would no longer issue damage mitigation permits for shooting flying-foxes for crop protection.¹⁰

While fruit-growers have criticised the decision, their response has not been widely supported or sustained. The decision received fairly limited media coverage. It is not a hot political issue for the government even though many fruit growers are in marginal seats. The reasons for the muted response include that the majority of fruit-growers have already moved to netting, and the numbers of growers applying to shoot have declined. This is one decision in a series of decisions that have increasingly limited fruit-growers' capacity to legally use lethal forms of crop protection, including a 2001 decision to ban the use of electric grids and the 2002 introduction of the shooting quota. Furthermore, the culture of fruit-growing has changed. Many growers do not support lethal methods of crop protection, and would prefer that their industry promote a clean and green image. They recognise the increasingly strong public expectation that fruit will be produced without wildlife deaths.

The Environmental Protection Agency is trying to assist affected growers in the short-term by providing access to noise deterrents for crop protection. They intend to conduct a strong monitoring program this fruit season to deter or prosecute illegal shooting.



In 2001 the Queensland government banned the use of lethal electric grids, after they were deemed inhumane. The grids shown here were found by the federal court to have killed about 18 000 flying-foxes in 2000.

COMPARISON OF QUEENSLAND AND NSW SITUATIONS

The situations in Queensland and NSW are similar. The same populations of flying-foxes are affected, as there is intermixing between Queensland and NSW of the three species that inhabit NSW. Crops affected and methods of crop protection have been similar (although very few growers in NSW used electric grids). As in Queensland, the majority of NSW fruit-growers have now netted.

One difference is that in Queensland permits cannot be issued unless the methods used are humane. In NSW there is no explicit requirement for this under the legislation used to issue licences for shooting, although there are indirect requirements via other legislation (see page 21). Another difference is that there have been far fewer flying-foxes shot under licence in NSW (see table below).

Shooting permits / licences issued in Queensland and NSW 2000-07

Fruit season	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
QUEENSLAND							
Permits issued	112	112	104	146	122	102	122*
FFs killed under permit**	12075	5384	5107	4747	3121	1474	3123
NEW SOUTH WALES							
Licences issued	67	54	62	53	27	41	32
FFs permitted to be 'harmed' under licence	2263	1852	2358	2331	852	1320	1155
FFs killed under licence**	1121	1160	?	1391	174	954	801

* Note that permits issued to shoot different species of flying-fox by the one fruit-grower are counted as separate permits. Some growers also received two consecutive permits for one month each. In 2006-07, 122 permits were issued to a total of 37 individual fruit growers or companies.

** It is a condition of licenses that returns specifying the number of flying-foxes killed be submitted to the government. This figure is based on those returns, and does not represent the actual number of flying-foxes killed.

Conservation reasons to ban shooting

CONSERVATION STATUS OF FLYING-FOXES

There have been massive declines in flying-fox populations since European colonisation. Early biologists observed huge camps of flying-foxes, numbering in the hundreds of thousands to millions.

In 1938 biologist Francis Ratcliffe estimated there were “many millions” of Grey-headed flying-foxes, but suggested they had already suffered a 50% reduction in abundance by the late 1920s.¹¹ Now there are an estimated 400,000 or so.¹²

A much more recent population decline of Grey-headed flying-foxes than that noted by Ratcliffe resulted in their listing under NSW and federal legislation as vulnerable to extinction in 2001. There was evidence of a 30% decline in numbers in the decade from 1989.¹³

In NSW, the main threat identified was “clearing or modification of native vegetation”, particularly of winter-spring feeding habitat. Orchard culling was also recognised as a threat, with reference to illegal culling of “large numbers”. The Scientific Committee noted “the impact of destructive methods has not been measured but is likely to be greatest in those years when natural food is scarce.”¹⁴

The majority of flying-foxes shot in orchards are lactating and pregnant females, which has the greatest impact on population levels.¹⁵ A recent study of flying-foxes killed or wounded in three NSW orchards found that 58% were female, of whom 69% were lactating or pregnant.¹⁶

The life history of flying-foxes renders them vulnerable to population declines. They have a low capacity for reproductive increase. Population stability requires high survival rates of adults and juveniles. Population modeling has shown that an imposed mortality as low as 10% in addition to natural mortality will lead to the rapid decline of a large population.¹⁷ Population recovery of Grey-headed flying-foxes therefore requires that combined anthropogenic sources of mortality be reduced to very low levels. Orchard culling (legal and illegal) is one of the easier sources of mortality to prevent.



A photo from biologist Francis Ratcliffe’s 1938 book *Flying Foxes and Drifting Sand* of a Little red flying-fox camp. Massive camps consisting of hundreds of thousands of flying-foxes were common.

ONGOING POPULATION DECLINES

Combined with other anthropogenic and preventable sources of mortality for flying-foxes – habitat clearing, electrocution on powerlines, and entanglement in barbed wire fences and backyard fruit netting – the shooting of flying-foxes is likely to be contributing to ongoing decline in the threatened population of Grey-headed flying-foxes. The full extent of shooting is unknown, but it is likely that numbers killed illegally substantially outnumber those killed legally.

A recent study by doctoral student Anja Divljan¹⁸ found that Grey-headed flying-foxes are in serious decline. The rates of birth and death in flying-foxes around Sydney indicate that the population is halving every 6.47 years, which would lead to extinction within 84 years if it continued. Divljan found that life history parameters used for previous population modeling were too conservative, and that Grey-headed flying-foxes are dying younger and reproducing less often than has been assumed. In the populations sampled, the age of first reproduction generally wasn't until 3-4 years, and there were very few bats (less than 3%) older than 10 years of age. The estimated rate of mortality across all age groups was 35%, higher than any previous estimates of adult mortality.

As well as directly causing mortality and reducing the population of a threatened species, licensed shooting in orchards has indirect conservation impacts that compromise species recovery. Scarce conservation resources are diverted to regulating the killing, rather than conservation, of flying-foxes. One of the barriers to flying-fox conservation is a widespread perception that flying-foxes are predominantly pests and undeserving of conservation. By condoning the killing of a threatened species, the state government is encouraging this perception. The government would not even contemplate allowing the large-scale killing of more publicly favoured threatened species.



Flying-foxes commonly get killed on barbed wire fences (TOP), in backyard netting (MIDDLE) and on power lines (BOTTOM).

Pictures: Tim Low, Mike Jupp, Jenny Maclean

ECOLOGICAL CONSEQUENCES OF DECLINING POPULATIONS

The decline of flying-fox populations has significant far-ranging consequences for Australia's environment. Flying-foxes are recognised as keystone species for their pollination of native trees (particularly in the *Myrtaceae* family) and seed dispersal. They are very important as long-range pollinators, promoting genetic flow between trees at greater distances apart (greater than 5 km) than other pollinators.¹⁹ This long-range capacity is very important to genetically re-link habitats fragmented by clearing.

Conservation of long-range pollinators will also be vital to promote adaptation of many native trees to climate change:

Species are more likely to survive climate change if there is ample gene flow between populations. Birds and flying-foxes that roam widely, and the trees they pollinate, are more likely to survive than species segregated into small, genetically isolated populations.²⁰

The capacity to adapt to climate change is compromised in human-dominated landscapes because of fragmentation and consequent loss of genetic diversity:

Since the recessive traits necessary for rapid response to climate change are frequently less competitive in current climates, they may be lost in small, fragmented populations. This will reduce the pool of individuals capable of rapid response to climate change or eliminate the genetic variants for rapid response altogether.²¹



Grey-headed flying-fox giving birth

Photo: Vivien Jones

A climate change report for Brisbane City Council advising on strategies to conserve biodiversity under climate change recommends there be a high priority placed on conservation of flying-foxes because of their long-range pollination capacity.²²

Long before flying-foxes become extinct as species they become *functionally* extinct, as populations decline below the threshold necessary to contribute significantly to seed dispersal and pollination.²³ As part of a general commitment to conserve biodiversity, and as part of adaptation to climate change, the NSW government should pay particular attention to promoting flying-fox conservation and do everything possible to recover flying-fox populations.

Welfare reasons to ban shooting

Flying-foxes are intelligent mammals with complex social lives, including a considerable variety of communicative vocalisations. They are clearly sentient and thus able to suffer pain. Their physiology of pain is very similar to that of humans.²⁴

For shooting of flying-foxes to be considered humane there are four conditions that must be satisfied:

1. There is a very high rate of instantaneous death, which requires that the shotgun pellets penetrate the brain to sufficient depth
2. Injured flying-foxes are quickly and humanely euthanased
3. Dependent young whose mothers are killed are placed into care or quickly and humanely euthanased

It is highly unlikely that any of these conditions can be satisfied.

HUMANENESS CONDITION 1: THERE IS A VERY HIGH RATE OF INSTANTANEOUS DEATH

Shooting a flying-fox humanely is very difficult for the following reasons:

- Shooting occurs at night, and flying-foxes are dark in colour;
- The target for instantaneous death (the brain) is small;
- The targeted flying-fox is likely to be moving;
- In the circumstances of an orchard in which shooting is occurring, flying-foxes are likely to be wary and not allow a close shot;
- It would be almost impossible to get a clean line of sight to the head of a flying-fox if it is flying away from the shooter;
- Shooting is typically done with shotguns, which spray relatively low-velocity pellets in a cone-shaped trajectory, and can only cause death, even if the aim is true to target, by multiple random wounding;
- The surface area of a flying-fox, with wings that may exceed 1 metre in diameter, is very large in comparison to the target and thus presents a large target for injurious pellets;
- The body of flying-foxes is quite dense, so shotgun pellets are likely to not penetrate sufficiently to kill quickly.

For these reasons the rate of instantaneous death for flying-foxes shot in orchards is likely to be low rather than high.

There is evidence from orchards that the rate of non-lethal injuries is very high. In 2007-8, an assessment of 155 dead and injured (and subsequently euthanased) flying-foxes collected from three NSW orchards found that just 5% (eight animals) had been shot in the head (and damage to the back of the head suggested most were shot in the head after falling to the ground). Autopsies on 31 of the euthanased flying-foxes found:

They suffered severe injuries including multiple compound fractures to bones, and head and body injuries that led to incapacitation but not death. If no intervention had taken place to

euthanase these bats they may have suffered many days before succumbing to predation, infection or dehydration and starvation.²⁵

The number of injured flying-foxes collected constituted a substantial proportion of the total number of licences issued to local orchardists. Further autopsies are being conducted and the results will be reported more formally when they are completed.

Because it is very difficult to gain evidence of cruelty from orchards, it is instructive to compare the shooting of flying-foxes with the recreational shooting of ducks, for which there is strong evidence of cruelty.²⁶ NSW banned recreational duck shooting in 1995.

Comparison of shooting ducks and flying-foxes

The shooting of ducks and flying-foxes is comparable because the targets are similar in size and both are typically shot in flight. However, the circumstances under which flying-foxes are shot in orchards suggest that injury rates would be considerably higher than in duck shooting.

Light conditions:

Shooting of flying-foxes occurs at night whereas duck shooting occurs mostly at dawn.

Shooting environment:

Shooting of flying-foxes takes place in more difficult surroundings—lots of trees, uneven ground, the shooter having to move around an orchard, sometimes windy/rainy conditions. Furthermore, some shooters spend many hours patrolling their orchards, and are picking fruit during the day, so would be tired (and therefore less accurate) when shooting

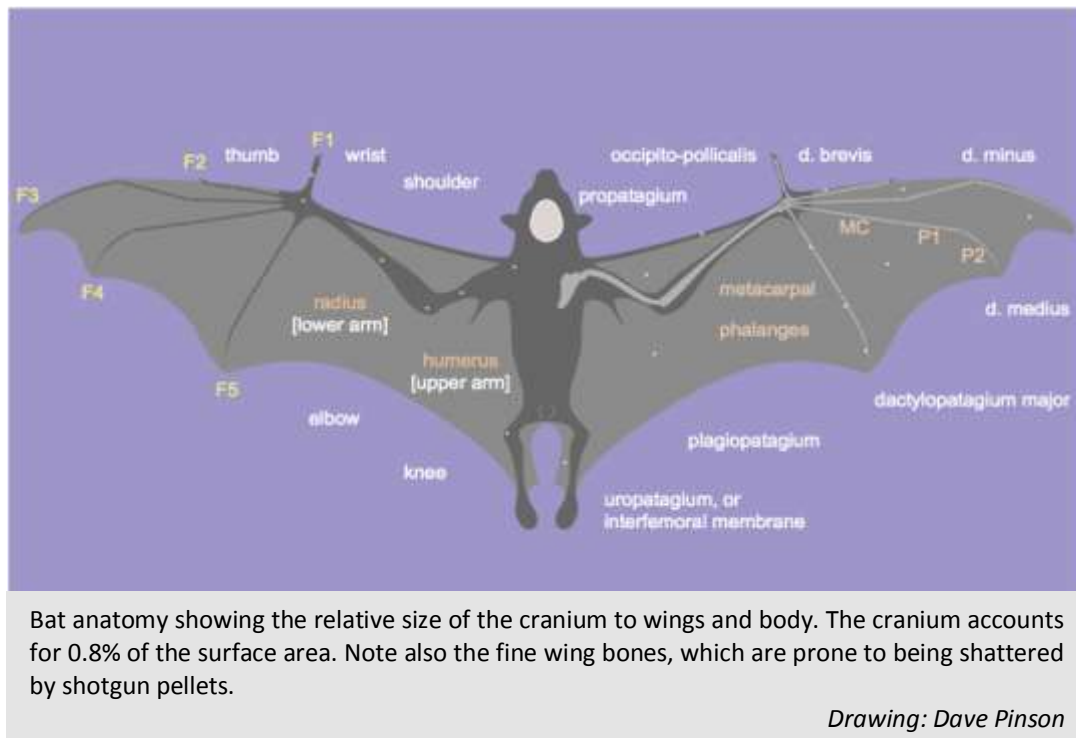
Surface-to-target ratio:

Studies of the wounding rates in duck hunting have found that the critical feature is the ratio of the 'vital' areas (the brain, heart and lungs) to the rest of the animal. X-ray sampling studies have shown that the larger the duck species the greater the proportion of them with embedded pellets. An Australian study of 40,000 ducks found that 9% of the relatively small grey teal had embedded pellets compared to 19% of the larger mountain ducks.²⁷ The relevant ratio for flying-foxes would fall within this range. The image overleaf shows the relative size of the target for instant death—the cranium is only about 0.8 per cent of the surface area of the flying-fox.²⁸



Injuries caused by shotgun pellets: X-ray showing two embedded pellets (TOP). A third pellet was lodged in the skull. There is a broken left humerus. The same animal with lodged subcutaneous pellet - the grey lump on the left (MIDDLE). X-ray of flying-fox with paralysed leg showing location of a shotgun pellet (BOTTOM).

Images provided by Mandi Griffiths, Suzanne & Henry Grzegorsky



Density of body:

The body of a flying-fox is denser than that of a duck, and therefore pellet penetration to vital organs that would result in a relatively rapid death is less likely:

Unlike birds, flying-foxes do not possess pneumatized bones or air sacs making them much denser (in the true sense of mass per unit volume). In addition, the body mass of a flying-fox substantially exceeds that of a similarly sized bird Owing to their denser bodies, flying-foxes are therefore likely to suffer a higher rate of non-lethal shots than would similarly sized birds such as ducks, all other factors being equal. This is because shots will not penetrate as far in flying-fox muscle mass as they would in less dense bodies such as ducks.²⁹

Skill & attitude of the shooter:

Primary producers are able to obtain a firearms licence simply because of their line of business, and there is no requirement for a skills test. There is no guarantee that a fruit grower licensed to shoot flying-foxes has the skills to do so. A shooter's attitudes towards an animal is also likely to affect the outcome of shooting—respect for an animal is likely to motivate attention to accurate shooting and follow-up to ensure that a downed animal has been killed rather than wounded. Many fruit-growers express hatred for flying-foxes—attitudes prevalent in submissions, letters to newspapers, and letters to politicians.

Studies of duck hunters have found that they are highly unreliable in reporting their own rates of kill. A 1987 Canadian study firstly asked hunters to estimate their cripple rate and then, from concealed hides, observed those same hunters and estimated cripple rates. The Canadian Wildlife Service staff observers counted 5 to 8 cripples for every 10 birds bagged (which also included wounded), but hunters admitted to only about 2 cripples for 10 bagged.³⁰ Fruit growers have no incentive to ensure that wounded flying-foxes are killed, in contrast to the greater incentive of duck shooters to do so.

HUMANENESS CONDITION 2: INJURED FLYING-FOXES ARE QUICKLY & HUMANELY EUTHANISED

Given the circumstances of shooting in orchards, it is almost impossible to gather evidence on this condition. For reasons already noted, it is highly unlikely that flying-foxes injured by shotgun pellets are found and euthanised. Firstly, many are likely to make it out of the orchard to die from injuries or infection some days later (carers occasionally receive into care flying-foxes that have been shot). Others would hide in fruit trees and even diligent searching would not locate them. Growers have very little incentive to search for injured flying-foxes.



HUMANENESS CONDITION 3: ORPHANED DEPENDENT YOUNG ARE PLACED INTO CARE OR QUICKLY & HUMANELY EUTHANASED

The ripening and harvesting of a considerable proportion of the NSW fruit crop coincides with the near-term pregnancy of flying-foxes, the carrying of dependent young and the crècheing of dependent young in the flying-fox camp. A high proportion of flying-foxes entering orchards in search of food are lactating mothers with young attached or left in the camp. The mother carries her baby with her for about the first three weeks after birth. It is unlikely that orchardists inspect flying-foxes to see if they are carrying a baby. After all, they are warned not to touch flying-foxes for health reasons and it is difficult to see young when they are suckling under the female's wing. Therefore it is likely that most attached juveniles die from starvation on the mother's body. According to carers who have rescued starving young, death can take up to one week.

There is no way of locating juvenile flying-foxes in a camp who have been orphaned by the death of their mother, so this condition cannot be met. Deprivation of maternal care and starvation undoubtedly cause great suffering.



From about 3 weeks after birth, juvenile flying-foxes are left in camp while their mothers go out to feed. Here in the Sydney Royal Botanic Gardens, a female Grey-headed flying-fox tends to her young (TOP), prepares to leave (MIDDLE), and flies out to feed (MIDDLE). The baby flying-fox waits in camp for its mother's return (BOTTOM).

Photos: Nick Edards

Health reasons to ban shooting

It is well accepted that environmental stresses compromise the immune capacity of animals like humans and flying-foxes. Reducing environmental stresses for flying-foxes may reduce health risks for humans.

It has recently been shown that Little red flying-foxes subject to reproduction and nutritional stresses have high infection rates of Hendra virus.³¹ Hendra is one of five new zoonotic viral diseases (transmissible between animals and humans) that have been found in Australasian flying-fox species (*Pteropus spp.*) since the mid-1990s.³²

The postulated spillover of Hendra virus into horses is part of a global pattern that links environmental disturbances with the emergence of new human diseases:

Anthropogenic environmental changes can therefore have significant consequences for ...public health through promoting the emergence of both zoonotic and wildlife diseases.³³

According to epidemiologists, the processes that may drive spillover of infection into other species are those that cause flying-fox decline, including “hunting, roost disturbance and habitat loss or alteration”.³⁴ In a recent ABC Radio National *Background Briefing* program on the issue, epidemiologist Hume Field said:

It might be that wildlife populations can cope and cope and cope with impacts, until they get to a certain threshold where their ecology is fundamentally compromised and then things crash in terms of their dynamics and then the associated infection dynamics of any agents that they are carrying. And it's those points, if you like, those tipping points, that can precipitate the emergence of a new disease.³⁵

The implication is that to protect human health, we should conserve flying-foxes and reduce the environmental stresses – including shooting – that increase their rate of infection and the risk of spillover to other species. Researchers are signalling a new approach to protecting public health that “involves curtailing the anthropogenic environmental changes, or demographic/human behavioural risk factors ultimately responsible for disease emergence.”^{36,37}



Flying-fox populations are subject to many different anthropogenic forms of stress that may affect their immune systems, including orchard shooting, food shortages due to habitat loss, camp dispersals and roost destruction. This flying-fox colony in Burdekin Park, Singleton, has been subjected to repeat noise harassment over many years in unsuccessful efforts to disperse it. There are currently three colonies in NSW under threat of dispersal by noise harassment. At time of publication the dispersal applications are being assessed by federal and state governments.

Photo: Storm Stanford

Legal reasons to ban shooting

OBLIGATIONS TO PROTECT AND RECOVER POPULATIONS OF GREY-HEADED FLYING-FOXES

The principal species shot is the Grey-headed flying-fox, which is listed as vulnerable on Schedule 2 of the NSW *Threatened Species Conservation Act, 1995* (the TSC Act) and on the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act, 1999* (Cth) (the EPBC Act).

Particularly relevant objects in Section 3 of the TSC Act are:

(b) to prevent the extinction and promote the recovery of threatened species, populations and ecological communities, and;

[...]

(d) to eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities.

Listing a species as threatened on the schedules to the TSC Act triggers a number of protective measures and gives rise to the potential application of criminal and civil offence provisions for harming those species or their habitats. It is an offence under section 118A of the *National Parks and Wildlife Act 1974* (NPWS Act) to harm a threatened species listed as vulnerable under the TSC Act.

These protective measures are undermined by the continued issuance of licences to harm grey-headed flying-foxes under s121 of the NPWS Act for mitigation of commercial crop damage. (Section 121 allows an authorised officer to issue a licence authorizing a person to harm protected fauna for specified activities if there is a threat to life or property.)

When the Grey-headed flying-fox was listed as vulnerable on the TSC Act in 2001 the then Director-General of NPWS, Brian Gilligan, publicly announced that licensing under s121 for shooting flying-foxes would be phased out within three years.³⁸ The NPWS Director General informed the Royal Zoological Society public forum on the management of the flying-fox as a threatened species in NSW that:

the interim policy will be in place for a three year period, during which time it is expected that all reasonable attempts will be made by orchardists to adopt other non-lethal deterrents...anyone who expected to be licensed beyond these three seasons from now on is going to have to be able to demonstrate that in fact other crop damage mitigation measures are in fact not available and not workable.

Mr Gilligan advised the Minister of the time in a briefing note (obtained under Freedom of Information) that without this commitment, "the NPWS will have great difficulty in assuring the public that it has met its obligations to conserve this species." He further advised that "the quota for GHFF for this season is not likely to have a long term effect on the populationonly where enforcement has been increased, and where licensed harm is limited to the next 3 years."³⁹

Enforcement effort remains poor and the licensed harm is ongoing seven years since the listing. There have been no prosecutions for harm to the species despite widespread reports of illegal shootings and orchardists overshooting their licences. Internal DECC documents indicate that the Department is aware of the harm being caused to flying-foxes as a result of the licences. The Annual Review for 2004/2005 states:

In fact it is often likely that a higher number of animals are harmed as the fruit growing season coincides with the breeding season and the dependent young of adult females killed

in orchards will also likely die. In addition, some orchardists may overshoot the number specified on their licence.

As the Director General warned in 2001, by facilitating ongoing shooting of flying-foxes for crop protection, DECC has failed to meet its obligations to protect the Grey-headed flying-fox and is undermining its recovery.

PROTECTION FROM ANIMAL CRUELTY

The *NSW Prevention of Cruelty to Animals Act 1979* (POCTA Act) prohibits acts of cruelty against an animal, and includes (Section 4):

any act or omission as a consequence of which the animal is unreasonably, unnecessarily or unjustifiably:

(a)...., killed, wounded,...maimed...

[...]

(d) inflicted with pain.

As documented in the section on welfare reasons to ban shooting (page 13), there is evidence of suffering of flying-foxes shot to protect fruit crops. Flying-foxes recovered from orchards, hours or days after being shot, have been euthanased, autopsied and their non-lethal injuries documented. It is arguable that flying-foxes injured in orchards have been subjected to 'unreasonable, unnecessary or unjustifiable' cruelty, particularly when wounded animals are not euthanased, and given the availability of alternative methods of crop protection.

Under the law both the shooters and the orchardists who hired the shooters may be liable for prosecution. Section 33 of the POCTA Act says that any person who aids, abets, counsels or procures the commission of an offence is taken to have committed an offence. It could be argued that this applies to the landholder and also DECC and its officers if they are aware of the cruelty that occurs on a property.

It should also be noted that the courts have held that failure to provide an animal with veterinary treatment where it is necessary to do so constitutes an offence under section 5 of POCTA Act.⁴⁰

The RSPCA and the NSW Animal Welfare League have standing to bring such prosecutions under the POCTA Act.

PROBLEMS WITH ENFORCEMENT

There have been no prosecutions for illegal killing of flying-foxes in NSW. This is despite widespread acknowledgement, including by DECC and fruit growers, that illegal shooting occurs.⁴¹ For at least the following reasons, it is likely that there is a high rate of illegal killing.

Size of quota

The numbers permitted under the current quota arrangement are relatively small, and amount to an average of less than one flying-fox per night of orchard protection (say, 50 flying-foxes over 6-8 weeks). While shooting is generally not very effective for crop protection, shooting one flying-fox a night is likely to be almost totally ineffective. The numbers permitted now are much smaller than numbers previously permitted when there was not a quota system, suggesting that growers consider they need to be able to shoot more than the quota allows to achieve crop protection. Even when orchardists were issued with permits for larger numbers, there was evidence that they were shooting more than permitted (noted below).

Enforcement limitations

Orchardists would have little fear of being caught if they exceeded licensed numbers, as the shooting is done at night on private property and no fruit grower has ever been prosecuted for killing more flying-foxes than permitted. The department has limited capacity to monitor shooting on orchards, as they are only able to enter a property for surveillance if they have a “reasonable suspicion” of non-compliance. In addition, insufficient resources are provided for enforcement operations. The 2005-06 Review noted “Limited investigations and compliance checks were undertaken by the DEC [now the DECC] due to limited resources.”⁴²

In an investigation of various flying-fox enforcement issues (initiated in 2002 and concluded in 2006), the Queensland Ombudsman recognised the lack of capacity of the Queensland EPA to enforce the permitted quota and noted that shooting small numbers of flying-foxes would not protect crops. The Ombudsman concluded “Sufficient evidence exists to question the ongoing viability of the DMP [Damage Mitigation Permit] system for flying-foxes.”⁴³

Flying-fox researchers Les Hall and Greg Richards comment on illegal killing in their book on flying-foxes:

A study on the animals killed on the NSW permit system estimated that in the seven years between 1986 and 1992, permits were allocated to cull over 240,000 flying-foxes. It also showed that these licensed people were only half of those actually culling flying-foxes, indicating the extent of the illegal practice, and that many more animals were actually killed. During recent trials on a new flying-fox deterrent system in orchards in northern NSW, it was established that most orchardists would cull approximately 20-30 flying-foxes each night during the harvest season (6 weeks) ... this equates to 840-1260 flying-foxes killed per orchard per season.⁴⁴

While numbers of flying-foxes legally culled have been substantially reduced there is no reason to believe that those who kill flying-foxes as their main form of crop protection and have previously killed flying-foxes illegally are shooting fewer simply because the quota has been reduced.

By allowing even small numbers to be killed under licence, the DECC makes enforcement much harder, for the sounds of shooting from an orchard (typically, the only way that an enforcement officer could tell if shooting was occurring without entering the property) are unlikely to constitute sufficient grounds for ‘reasonable suspicion’ of illegal killing. In contrast, if shooting was banned, surveillance of orchards would be simplified and the sound of shooting may be grounds for ‘reasonable suspicion’. A complete ban would mean that even small numbers of dead flying-foxes could constitute evidence of an offence.

Options and support for growers

By banning shooting, the NSW government would not deprive fruit growers of the only method, or of a very effective method, of crop protection. Most growers now net their crop, a much more effective method of protection.

Growers have reported that shooting helps protect crops when flying-fox pressure is low, but not when it is high.⁴⁵ There are many other disadvantages of shooting for fruit-growers as well – it is a very onerous and tiring method of crop protection, at the busiest time of the fruit season.

With most growers having adopted other forms of crop protection, shooting is now used as crop protection mostly on smaller orchards. In 2005-06, for example, the crop area covered by shooting licences ranged from 4-49 ha with an average size of 11 ha.⁴⁶ There is no requirement that orchards be commercially viable or well managed for growers to receive licences to shoot flying-foxes.

ALTERNATIVE METHODS OF CROP PROTECTION

Full exclusion netting is the only consistently effective method for protecting fruit crops, and is recommended by governments and industry experts as best practice.⁴⁷ Because it makes economic sense for most orchards to be netted, there has been a large uptake and consequent decline in the number of growers using lethal methods of crop protection. The extent of uptake is unknown, but in some areas it has been estimated as greater than 90%.⁴⁸

Unfortunately, for those growers who are unwilling or financially unable to net, cheaper alternatives such as lights, noise, odours and decoy feeding have not proven to be consistently effective, or have yet to be properly tested. Like shooting, available deterrents using lights, noises and odours are reported to provide some protection when flying-fox pressure is low, but limited protection when pressure is high.⁴⁹ The general view is that flying-foxes eventually become habituated to most forms of deterrents. Nonetheless, these methods represent options for some growers in some circumstances.

Financial assistance for the adoption of alternative methods of crop protection is available through the Low Interest Loan Scheme from the Rural Assistance Authority. But very few growers have taken advantage of this. Growers have reported that the application process is too cumbersome and complex, the means (asset) test is too low, and the loan has to be repaid at an unreasonable interest rate.⁵⁰



A peach orchard in northern NSW with full exclusion netting, a totally effective method of protecting crops against flying-foxes and birds.

Photo: Nancy Pallin

CURRENT RESEARCH

The Department of Primary Industries, Department of Environment and Climate Change, the Hawkesbury Nepean Catchment Management Authority and horticulturists in the Sydney Basin are undertaking the Grey-headed Flying-foxes in Orchards project, which seeks to assess the extent of flying-fox damage to commercial crops in NSW, to determine flying-fox density/crop damage relationships, and to determine the effectiveness of damage mitigation strategies used (including shooting, and non-lethal methods such as netting) and cost-benefit analyses of the alternative mitigation strategies. The project, funded by the Commonwealth Natural Heritage Trust, will conclude in March 2009.⁵¹

SUPPORT FOR GROWERS

It is acknowledged that the Australian horticultural industry contributes to the health and wellbeing of Australians, and that some growers are economically affected by flying-foxes. However, like other businesses, commercial fruit growers have a responsibility to avoid harming the environment. All kinds of businesses have had to invest in new production or waste disposal methods to reduce detrimental impacts on the environment.

The organisations endorsing this report recommend that the state government assists growers to move to non-lethal forms of crop protection. This is consistent with the draft Grey-headed Flying-fox Recovery Plan,⁵² which recommends subsidised incentives that may include:

financial assistance with installing capital-intensive crop protection mechanisms such as full-exclusion netting, a program of industry restructuring and reform, or a scheme for growers to insure against flying-fox damage.

The current research referred to above should provide the basis for assistance.

Conclusion

The 58 groups endorsing this report directly represent tens of thousands of people. For the reasons outlined in this report, the groups call on the NSW state government to cease issuing licences for orchardists to shoot flying-foxes as a method of crop protection.

Shooting contributes to the ongoing population decline of threatened Grey-headed flying-foxes, and undermines prospects for recovery. As a consequence, ecologically vital pollination and seed dispersal functions are compromised.

Shooting is inhumane. It inevitably inflicts suffering by injuring flying-foxes and orphaning dependent young, who starve to death.

Shooting is contrary to the legal obligations of the NSW government and community for the conservation and welfare of flying-foxes.

Shooting is unnecessary as a method of crop protection for there are effective, non-lethal alternatives.

Flying-foxes are subject to severe and diverse pressures that are causing ongoing population declines. It is time for government and community to focus on their survival and recovery. Bringing an end to shooting for crop protection is an essential part of this task.



Flying-foxes can fly more than 100 km in an evening of feeding, helping pollinate trees distant from each other and spreading seeds. By maintaining gene flow across large distances, flying-foxes will help eucalypts and other Australian trees adapt to climate change. Flying-foxes can also fly thousands of kilometers between camps.

Photos: Nick Edards, Ofer Levy, Ivor Davies

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