NSW GOVERNMENT | Office of Environment & Heritage

Standard operating procedure for the shooting of flying-foxes

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1. Background

Three species of flying-fox occur in NSW: the black flying-fox (*Pteropus alecto*), the grey-headed flying-fox (*Pteropus poliocephalus*), and the little red flying-fox (*Pteropus scapulatus*). While all three species will forage in fruit crops, it is the grey-headed and black flying-foxes that are most often implicated by farmers. The grey-headed flying-fox is listed as a vulnerable species on Schedule 2 of the NSW *Threatened Species Conservation Act 1995*, and as a Vulnerable Species under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Flying-foxes generally roost in camps during the day and forage in nearby food sources during the night but may travel long distances to feed. Shooting is usually conducted as the flying-foxes fly into orchards after dusk to feed.

Flying-foxes can cause significant damage to cultivated fruit crops in NSW. Although flying-foxes mainly feed on the nectar, pollen and fruit of native vegetation they may seek out alternative food sources such as apples, mangoes, lychees, pome fruit, pawpaw, persimmon, and bananas but particularly stone fruit and apples. A number of methods have been used in an attempt to reduce flying-fox damage to crops including scaring devices, olfactory, visual or acoustic deterrents and lethal control such as shooting. The NSW Department of Primary Industries (DPI) and the NSW Office of Environment and Heritage recommend full-exclusion netting as the most effective method to mitigate against crop damage.

This standard operating procedure (SOP), written specifically for NSW, does not replace or override any relevant legislation. Its use is subject to applicable legal requirements (including OH&S) operating under any relevant legislation. Adherence to the SOP is a condition of licences to harm flying-foxes issued under section 120 of the *National Parks and Wildlife Act 1974*.

2. Application

- Shooting should only be used in a strategic manner as part of a co-ordinated program designed to achieve sustained and effective damage mitigation.
- Shooting can be used as a scaring strategy to deter flying-foxes from a particular location (i.e. the orchard). To generate an avoidance response in the majority of flying-foxes, it is thought necessary to kill some of the group to establish the real danger associated with shooting.
- Shooting of flying-foxes as a crop protection measure must be undertaken in accordance with relevant State and Commonwealth legislation. A general licence, issued under section 120 of the *National Parks and Wildlife Act 1974* to legally harm black flying-foxes, grey-headed flying-foxes and/or little red flying-foxes must be obtained from the Office of Environment and Heritage before any shooting occurs.
- Shooters must conform to all aspects of the general licence to harm flying-foxes, including the completion and submission of the flying-fox record sheet after the shooting program.
- Shooting of flying-foxes must only be performed by skilled operators who have the necessary experience with firearms and who hold the appropriate licences and accreditation. They must be proficient at shooting moving targets with a shotgun.
- Storage, use and transportation of firearms and ammunition must comply with relevant legislative requirements.

3. Animal welfare considerations

3.1 Impact on target animals

- Humaneness of shooting as a control technique depends greatly on the skill and judgement of the shooter. If properly carried out, shooting can be a humane method of destroying targeted animals. On the other hand, if inexpertly carried out, shooting can result in wounding which may cause considerable pain and suffering.
- Flying-foxes are usually shot after dusk when they fly from day camps to foraging areas. Because lighting at this time is poor, shooters target moving animals silhouetted against the evening sky which can result in reduced accuracy and high wounding rates. Poor lighting also makes it difficult to locate animals that are wounded but not killed. For these reasons it is essential that a spotlight is used during shooting to improve shooting accuracy and enable prompt follow-up and euthanasia of any wounded animals.
- Shooting to kill must be conducted in a manner which maximises its effect thus causing rapid death. This requires the use of appropriate firearms and ammunition. A 12 gauge double barrel shotgun, or single barrel with multiple shot configuration, is the most suitable firearm with heavy shot (between BB and no.4 with a shot charge of 32 grams.) to achieve adequate penetration. The pattern of pellet penetration is also critical to achieve sufficient hits in vital areas. Generally, the larger the shot, the poorer the shot pattern but the greater striking energy of the individual pellets. It is the combination of shot size, choke and distance to the target that determines the accuracy and effectiveness of the shot. Firing of two rapid successive shots will also increase the likelihood of achieving rapid insensibility.
- Skill at shot placement is one of the most important factors governing humaneness. The shooter must aim to have either the head (brain) or chest (heart-lung) of the flying-fox in the centre of the pattern at the point of impact.
- Only one flying-fox must be targeted at a time. Shooting with a shotgun at a group of flying-foxes flying overhead often results in welfare problems as the animals aligned with the central cluster of pellets will usually be fatally injured, but those at the perimeter of the volley may only be hit by one or two pellets and stand a good chance of surviving albeit wounded. These animals are likely to experience suffering.
- Wounded flying-foxes must be located immediately and killed as quickly and humanely as possible with either another shot preferably directed to the head (where safe and appropriate e.g. animals in trees) or in restrained or immobile flying-foxes on the ground, a blow to the rear of the skull to destroy the brain. If left, wounded animals can suffer from the disabling effects of the injury, from sickness due to infection of the wound, from pain created by the wound or from thirst or starvation if unable to drink or eat. Wing fractures, which increase the likelihood of being taken by a predator, are common in wounded flying-foxes.

3.2 Impact on non-target animals

- Shooting of female flying-foxes can have major negative welfare impacts on any dependent young. The vast majority of flying-fox births occur from October to December which corresponds to, or overlaps with, the fruit harvest season in many parts of NSW.
- After birth, young animals are carried on the ventral surface (chest and belly) of their foraging mothers for four to five weeks. If the female is shot whilst they are attached, the

young may be killed by the initial shot, be wounded from the shot or killed or wounded from the fall to the ground.

- Juvenile flying-foxes (i.e. from four to five weeks of age) are left in camps whilst their mother forages and are still dependent on the female for milk and other maternal care. If their mother is shot, these young are orphaned and will most likely die from dehydration/starvation. Young are not fully independent until they are around five or six months old.
- Where possible, shooting should be avoided at times when flying-foxes are giving birth and/or dependent young are present.
- Shooting can be target specific and does not usually impact on other species. However, there is a risk of injuring or killing non-target animals, including livestock, if shots are taken at movement, colour, shape, sound or, when spotlighting, eye reflection ('eye shine'). Only shoot at the target animal once it has been positively identified. Also, never shoot over the top of hills or ridges as other animals or people may be out of sight beyond the hill within the firearm danger zone.

4. Health and safety considerations

- Extreme caution must be taken when handling flying-foxes as they may carry Australian bat lyssavirus that can affect humans and other animals. Only experienced flying-fox handlers who have been vaccinated for rabies should attempt to handle or catch injured animals. Personal protective equipment such as puncture-proof gloves, long sleeves, masks and eye protection should be used when handling live animals. Avoid contact with the blood and saliva of flying-foxes. If bitten or scratched, immediately scrub the wound with soap and water and seek medical advice. Where possible, without placing others at risk of exposure, keep the animal and submit for testing to the State diagnostic veterinary laboratory. Wear gloves when handling carcasses and routinely wash hands afterwards. For further information see NSW Health fact sheet on lyssavirus.
- All participants in the shooting program should stand well behind the shooter when an animal is being shot. The line of fire must be chosen to prevent accidents or injury from stray bullets or ricochets.
- Firearm users must strictly observe all relevant safety guidelines relating to firearm use, ownership and possession.
- Firearms must be securely stored in a compartment that meets state legal requirements. Ammunition must be stored in a locked container separate from firearms.
- Adequate hearing protection should be worn by the shooter and others in the immediate vicinity of the shooter. Repeated exposure to firearm noise can cause irreversible hearing damage.
- Safety glasses are recommended to protect the eyes from gases, metal fragments and other particles.

5. Equipment required

5.1 Firearms and ammunition

- A 12 gauge shotgun (with either double barrel or single barrel with multiple shot configurations) and heavy shot (between BB and no. 4 with a shot charge of 32 grams.) must be used.

- Non-toxic shot (e.g. tungsten-bismuth-tin, bismuth, tungsten-iron, steel, bismuth-tin, zinc etc.) must be used. Lead shot is potentially toxic to a range of species and is illegal in some areas. Animals may be poisoned by lead in one of two general ways:
  - Species such as waterfowl mistake spent shot for food or grit and ingest it from wetland or terrestrial environments.
  - Other species, especially eagles and other raptors, and scavengers, ingest pellets when they consume prey that have been shot with shotgun ammunition and are carrying shot pellets embedded in their tissues.
- If intending to use steel shot ensure that it is safe and effective to do so in your particular gun. Steel pellets should only be discharged in modern guns that are capable of withstanding the extra stresses produced.
- To ensure that the shot delivers a dense pattern on the target animal within the specified distance, a tighter choke must be used i.e. half to full. Because shot patterns can vary between guns, it is essential to pattern your gun/cartridge/choke combination before shooting to check your accuracy and that the pattern is adequate for shooting flying-foxes. In order for a pattern to be effective it must possess sufficient pattern density to reliably hit the vital areas (brain, heart/lungs) of the target flying-fox and contain pellets capable of delivering adequate energy to penetrate those vital areas at the range you shoot the flying-fox. For further details on shotgun patterning see (for example):
  - Essential shotgun patterning
  - Codes of practice - The British Association for Shooting and Conservation
- The accuracy and precision of firearms must be tested against inanimate targets immediately prior to the commencement of any shooting operation.

5.2 Other equipment

- A handheld spotlight (minimum 100 watt).
- Lockable firearm box.
- Lockable ammunition box.
- Personal protective equipment (hearing and eye protection).
- First Aid kit.
- Thick, puncture-proof gloves

6. Procedures

6.1 Conduct of shooting

- Shooting is most often conducted at and after dusk when lighting conditions and visibility are poor. To increase accuracy, reduce wounding and enable prompt euthanasia of wounded animals, shooting operations must be conducted by a team of at least two people, one to perform the shooting and another to hold and direct the spotlight onto the target animal and keep it in the beam until it after it has been shot and confirmed as dead.
- Shooting must **not** be conducted in adverse weather conditions where flying-foxes cannot be shot and located/retrieved in a safe and humane manner.
- Flying-foxes must **not** be shot from a moving vehicle or other moving platform. Ensure you are in a firm, safe and stable position before taking a shot.

- Shooting at moving targets requires skill and practice to achieve constant effective results.
- Shooting operations should conform to local council guidelines for the minimisation of noise pollution.

Target animal and point of aim

- A flying-fox should only be shot at when:
  - it can be clearly seen and identified and is safe to do so
  - it is within the effective range of the firearm and ammunition being used
  - a humane kill is highly probable. If in doubt, do **not** shoot.
- Only one flying-fox must be targeted at a time. The shooter should aim to have a single animal in the centre of the shot pattern at the point of impact. Shooting at a group of flying-foxes is not an acceptable practice.
- The objective is to fire at the closest range practicable in order to reduce the risk of non-lethal wounding. Accuracy is important to achieve a humane death. The shooter must fire two rapid, successive shots into the target animal with the aim of achieving instantaneous loss of consciousness and rapid death without resumption of consciousness.
- When using a shotgun, the target flying-fox may be stationary or mobile, but should be no more than 25 metres from the shooter. The pattern of shot must be centred on the top third of the torso to achieve adequate penetration of the brain and/or chest. It is essential that the distance to the target animal is accurately judged. To achieve adequate penetration of shot, the flying-fox must be in effective range of the firearm being used. It is recommended that shooters practice estimating distances before a shooting operation.
- Death of the target flying-fox must be confirmed before moving on to the next animal. Without handling the flying-fox, death of animals can be indicated by observing the following:
  - absence of movement
  - absence of rhythmic, respiratory movements.
- If there is in any doubt that the animal is dead, it should be killed immediately with a blow to the rear of the skull using a hard and heavy blunt instrument (e.g. metal pipe, wooden club etc.) to destroy the brain or alternatively by taking a another shot preferably directed to the head, where safe and appropriate e.g. animals in trees.
- In instances where injured animals have flown into trees, where it is safe to do so, they must either be killed with further shots or retrieved and killed quickly and humanely.
- All animals must be checked to identify any females with dependent young that may still be attached. Note that dependent young can be difficult to see and manipulation of the female carcass may be required to locate them (also see work health and safety section re potential biohazards). Dependent young may also be located nearby where shot females have fallen. If alive, they must be quickly and humanely euthanized with a blow to the skull using a hard and heavy, blunt instrument (e.g. metal pipe, wooden club etc.) to destroy the brain. Death must also be confirmed in dependent young.
- Additional searches for wounded animals must be conducted the following morning to locate any animals that may have been missed.
- Killed flying-foxes must be collected and disposed of in an appropriate manner (i.e. buried or incinerated) in accordance with acceptable practices as required by local

councils and applicable state or federal regulations. NPWS officers must be informed of the disposal site on each licence application and site be made available for inspection.

7. Further information

Contact the relevant Commonwealth or State government agency from the following list of websites:

- Commonwealth Department of Sustainability, Environment, Water, Population and Communities
  www.environment.gov.au/
- NSW Office of Environment and Heritage
  www.environment.nsw.gov.au/
- NSW Department of Primary Industries
  www.dpi.nsw.gov.au

Also refer to:

- Invasive animals Cooperative Research Centre
  www.invasiveanimals.com/index.php

7.1 References and further reading

Agriculture and Resource Management Council of Australia and New Zealand (1999). 'Ausvetplan: Disease strategy for Australian bat lyssavirus in domestic animals and captive bat colonies.' (Department of Agriculture Fisheries and Forestry: Canberra).

American Veterinary Medical Association (2001). 2000 Report of the AVMA Panel on Euthanasia. *Journal of the American Veterinary Medical Association* **218**, 669-696.

BASC (2008). Shotgun chokes and patterns information sheet. British Association for Shooting and Conservation, Wrexham, viewed 23 June 2009, <http://www.basc.org.uk/en/utilities/document-summary.cfm/docid/8A3BD2EF-3DBD-4684-A7E83C62658C5E51>

Botanic Gardens Trust (undated). Flying- foxes factsheet. Royal Botanic Gardens, Sydney, viewed 17 June, 2009, <http://www.rbgsyd.nsw.gov.au/welcome_to_bgt/royal_botanic_gardens/garden_features/wildlife/flying-foxes>

Cassidy, M. (2000). Smooth-bore firearm injuries. In J. K. Mason and B.N. Purdue, B. N. (eds.) *The pathology of trauma*. 3rd edition. Arnold, London, pp 61-74.

Davidson, R., Thomson, R. D. and Birbeck, A. E. (2002). Computational modelling of the shot pattern of a sporting shotgun. *Sports Engineering*, **5**: 33-42.

Department of Environment and Conservation (2005). Policy and procedural guidelines for the mitigation of commercial crop damage by flying-foxes. NSW Department of Environment and Conservation, Hurstville, viewed 19 July 2009, < http://www.environment.nsw.gov.au/resources/nature/PolicyFlyingfoxCommercialCropDamage2005.pdf >

Divlijan, A., Parry-Jones, K. and Eby, P. (2009). Report on deaths and injuries to grey-headed flying-foxes, *Pteropus poliocephalus* shot in an orchard near Sydney, NSW. Unpublished report.

Dolbeer, R. A., Holler, N. R. and Hawthorne, D. W. Identification and control of wildlife damage. *In* T.A. Bookhout (Ed.) *Research and management techniques for wildlife and habitats*. 5th ed., rev. The Wildlife Society, Bethesda, pp 474-506.

Draisma, M. (undated). Essential shotgun patterning. Sporting Shooters Association of Australia, viewed 25 June, 2009 < http://www.ssaa.org.au/stories/shotguns-essential-shotgun-patterning.html>

Endicott, C. (2008). Shotgun patterning: What is it and why it's important. In *Oklahoma Waterfowl Guide, 2008-2009*, p 20, viewed 23 June, 2009, <www.wildlifedepartment.com/2008Waterfowlguide.pdf>

Gregory, N. (2004). *Physiology and behaviour of animal suffering*. Blackwell Publishing, Oxford.

Hall L, Richards G (2000). 'Flying-Foxes: Fruit and Blossom Bats of Australia.' UNSW Press:, University of New South Wales).

Noer H, Madsen J, Hartmann P (2007). Reducing wounding of game by shotgun hunting: Effects of a Danish action plan on pink-footed geese. Journal of Applied Ecology 44, 653-662.

Department for Environment and Heritage (2007). Code of practice for the humane destruction of birds by shooting in South Australia. SA Government Department for Environment and Heritage. Viewed 23 June, 2009 <http://www.environment.sa.gov.au/biodiversity/faunapermits/pdfs/fape_pdfs_hum_dest_birds.pdf>

Sainsbury, A. W., Bennett, P. M. and Kirkwood, J. K. (1995). The welfare of free-living wild animals in Europe: Harm caused by human activities. *Animal Welfare* **4**: 183-206.

Smith, G. (1999).'A guide to hunting and shooting in Australia.' (Regency Publishing: Regency Park, SA).

Tidemann, C. R. (1995). Grey-headed flying-fox. In 'The Mammals of Australia'. (Ed. R. Strahan). (Reed New Holland: Sydney).

UFAW (1985). Humane control of land mammals and birds. Universities Federation for Animal Welfare, Potters Bar, England.

Waples, K. (2002). Review of the NPWS policy on the mitigation of commercial crop damage by flying-foxes. In 'Managing the Grey-headed Flying-fox as a Threatened Species in New South Wales'. (Eds P. Eby and D. Lunney) pp. 39-46. (Royal Zoological Society of New South Wales: Mosman, NSW).