NATSOP-DEER001

NATIONAL STANDARD OPERATING PROCEDURE: AERIAL SHOOTING OF FERAL AND WILD DEER

Endorsed by the Environment and Invasives Committee 31 January 2023. Updated 31 July 2024.

Reference as:

Terrestrial Vertebrate Working Group (2023) NATSOP-DEER001 National Standard Operating Procedure: Aerial Shooting of Feral and Wild Deer. Australia.

Available for download at **pestsmart.org.au/toolkits/feral-deer/**

Associated documents (referred to as associated CoP and NATSOPs) relating to NATSOP-DEER001 National Standard Operating Procedure: Aerial Shooting of Feral and Wild Deer, include:

- National Code of Practice for the Effective and Humane Management of Feral and Wild Deer
- NATSOP-DEER002 National Standard Operating Procedure: Ground Shooting for Feral and Wild Deer
- NATSOP-DEER003 National Standard Operating Procedure: Trapping for Feral and Wild Deer

This document outlines best practice guidelines for the effective and humane management of feral and wild deer in Australia.

The Code of Practice (CoP) outlines humane control strategies and their implementation while National Standard Operating Procedures (NATSOPs) describe control techniques, their application, and strategies to minimise any harmful impacts.

The national CoP and NATSOPs comprise model guidelines that set minimum animal welfare standards. They do not override CoPs and SOPs in jurisdictions where these documents have been developed, prior to or after the endorsement of these documents, to address specific management issues or to comply with relevant legislation. For example, the national-level CoP and NATSOP for the management of feral and wild deer are not relevant in New South Wales, which currently has both state-level COP and SOPs in place (Sharp et al, 2022).

This NATSOP along with associated CoP and NATSOPs will be reviewed by the Terrestrial Vertebrate Working Group (TVWG) within 12 months when they were endorsed, to manage any potential risks to operations throughout the country.

Jurisdictions conducting operations for feral and wild deer control are encouraged to submit reports to the TVWG secretariat for discussion at either the 12 monthly review, or sooner if there are urgent matters that need to be raised. The reports should include:

- whether the national CoP and NATSOPs were implemented in their jurisdiction
- whether the national CoP and NATSOPs was effective
- apparent mistakes or oversights in the national CoP and NATSOPs
- unintended consequences or adverse events that occurred when implementing the national CoP and NATSOPs
- new techniques or modifications to existing techniques as a result of research or registration

These reports will form the basis of reviews by the TVWG.

This document is based on the original work by Sharp, Cope and Saunders titled 'NSW Code of Practice and Standard Operating Procedures for the Effective and Humane Management of Feral Deer' published in 2022. Some of the text is a direct reproduction of the original source, with minor edits to adapt it for a national audience. The national document was then developed with guidance, input, and reviews by the multi-jurisdictional membership of the Terrestrial Vertebrate Working Group and the Environment and Invasives Committee. The document was further improved by feedback from Animal Welfare Organisations, veterinary surgeons, contractors, and operational and policy government staff.

This document has been endorsed by the Environment and Invasives Committee.

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PREFACE

This National Standard Operating Procedure (NATSOP) should be read in conjunction with the overarching National Code of Practice for the Effective and Humane Management of Feral and Wild Deer, to ensure that the most appropriate pest control techniques are selected and deployed in combination with other techniques, to achieve rapid and sustained reduction of pest animal populations and impacts.

This NATSOP builds on the extensive work conducted by NSW over several years (see Sharp *et al.* 2022), which provided the springboard for expansion to a national approach. This NATSOP and the associated CoP and NATSOPs provide the most relevant and up-to-date information to support best practice approach to feral deer management for all regions.

This NATSOP and the associated CoP and NATSOPs also cover the activities of recreational or sporting shooters in some jurisdictions, but not in others, as specified by jurisdictional legislation. This NATSOP also recognises that differences exist among jurisdictions in their approaches to managing feral deer. For example, access to suppressors for firearms varies among jurisdictions. Variations and modifications to pest control techniques among jurisdictions will be reflected in jurisdiction-specific CoP and SOPs, which take precedence over the national versions.

BACKGROUND

Aerial shooting programs

Aerial shooting of feral deer from a helicopter is used over large spatial scales and in inaccessible areas. It is a cost-effective primary method of quickly reducing feral deer populations. At a minimum, teams involved in aerial culls from a helicopter require a shooter and a pilot. An observer may be included to look for and report hazards, ensure the helicopter does not leave the approved shooting area, identify targets for the pilot, and record locations, species, and numbers of animals killed. The pilot aligns the helicopter for the optimum shot, advises the shooter when it is safe to engage, confirms kills, and advises on requirements for additional shots for humaneness purposes. Pilots and shooters undertaking aerial shooting must be assessed as competent by an appropriate accreditation process relevant to the jurisdiction.

Aerial shooting is a humane method of killing feral deer when:

- it is carried out by experienced and skilled aerial shooters and pilots
- the animal can be clearly seen and is within range of the firearm
- appropriate firearm and ammunition are used
- shots are placed in either the head (brain) or chest (heart-lung)
- using a minimum of 2 shots per animal policy
- wounded animals are promptly located and killed
- appropriate flyback procedures are applied.

The type of helicopter used in aerial shooting is dependent on jurisdictional requirements, operators, the programs being undertaken, the terrain, equipment being used and number of people in the helicopter. Crew configurations in aerial shooting operations will vary depending on the jurisdiction, equipment being used, target deer species, and the number of shooters.

Thermal imaging equipment can be used to increase the number of feral deer detected during aerial shooting programs. In areas of challenging terrain and dense vegetation, thermal imaging equipment is recommended because it can help maximise welfare outcomes for feral deer, which may be visually obscured after being shot. The thermal imagery easily reacquires the feral deer so a second shot can be taken, providing a quick humane death. This equipment can be used in aerial shooting programs through the addition of thermal equipment for the shooter, and/or through the addition of a dedicated thermal imager operator as additional crew in the helicopter. The increased rates of detection of feral deer and the distance at which feral deer can be detected at is dependent on the quality of thermal imaging equipment being used. Configuration of the crew with an additional thermal imager operator may be subject to jurisdictional requirements.

In Australia, both rifles and shotguns are used by contractors and government agencies in aerial shooting operations for feral deer. Shotguns are also routinely used on red deer in New Zealand with good welfare outcomes. Some aerial operations, in Australia, routinely carry two firearms, a rifle and shotgun, in aerial shooting operations for chital and fallow deer, enabling them to swap firearms.

Some aerial shooting operations use two shooters in the helicopter, allowing for two types of firearms (e.g. shotgun and rifle) to be used interchangeably. If using this arrangement, the two firearms are never used at the same time. Under the direction of the pilot, the presence of two shooters enables a rapid response when deer are found. For example, the pilot can advise one shooter to ‘hold fire’, turn the helicopter by 90 degrees, and advise the other shooter to engage their firearm.

Detailed investigations into maximising the efficiency of the aerial shooting operation and animal welfare outcomes will continue to feed a best practice approach to feral deer management in Australia.

APPLICATION

Aerial shooting programs

- Aerial shooting programs must comply with relevant Commonwealth, state, and territory legislation, policy, and guidelines specificallythe Civil Aviation Safety Regulations and subordinate documents.
- Helicopter operators must have approval from the Civil Aviation Safety Authority (CASA) to undertake aerial shooting operations and flying at low levels.
- Helicopter pilots must hold the appropriate licences and permits and be experienced in flying aerial operations as per CASA requirements including Part 138 (Aerial Work Operations) Manual of Standards 2020.
- Shooting of feral deer should only be performed by skilled operators who have the necessary ability and experience with firearms and who hold the appropriate licences and accreditation for the task as per CASA requirements including Part 138 (Aerial Work Operations) Manual of Standards 2020.
- Aerial shooting should only be used in a strategic manner as part of a coordinated program designed to achieve sustained effective control. A shooting operations plan must be prepared and approved by the relevant agency for each program.
- Storage, transportation, and use of firearms and ammunition must comply with the relevant legislation, policy, and guidelines.

- Aerial shooting may be affected by adverse weather conditions (e.g., strong wind, rain, low cloud).
- Shooter(s) must only engage under the direction of the pilot.
- Use of thermal equipment can increase visibility of target animals and effectiveness of program in particular in areas of dense vegetation and low light; to ensure maximum temperature differences, thermal equipment should be used in the few hours after dawn and before dusk, during autumn, winter, and spring.

ANIMAL WELFARE CONSIDERATIONS

Impact on feral deer

- Aerial shooting can be conducted with a high level of humaneness with the right skill and judgement of the shooter and observer/camera operator.
- Shooting must be conducted in a manner which maximises its effect, causing rapid death. This outcome requires appropriate use of firearms and ammunition.
- Head (brain) or chest (heart-lung) shots are to be used.
- A chest (heart-lung) shot causes tissue damage and death from haemorrhaging of major blood vessels. If the shot stops the heart functioning, the animal will rapidly lose consciousness. Correctly placed head shots cause brain functions to cease, insensibility is immediate (refer to Figure 1 and Figure 2).
- A target animal is only shot when:
    - it is clearly visible
    - it is within effective range of shooter and the firearm and ammunition being used
    - a humane kill is probable.
- The pilot must offer the shooter the best opportunities for a humane kill. This support includes maintaining a stable shooting platform and ensuring the helicopter is aligned so that the shooter can maintain accuracy and to avoid non-lethal shots (e.g., to the spine or neck).
- If an animal is wounded, all reasonable effort must follow to ensure it is killed quickly and humanely. This follow-up is achieved by:
    - using a deliberate policy to accurately place multiple shots per animal, instead of a single shot
    - thermal cameras can help ensure no wounded animals remain in dense vegetation.
- If an animal is wounded and cannot be found to deliver a subsequent shot, all reasonable effort must follow to find and kill the injured animal quickly and humanely.
- Each shot animal must be considered dead by the shooter and the pilot or camera operator, and verbally announced as a ‘kill’ before shooting any other animal.
- The cost of ammunition, number of shots fired, and extra flying time must not deter shooters from applying the appropriate follow-up procedures.
- Aerial shooting should not be carried out if the nature of the terrain reduces accuracy or prevents the humane and prompt shooting of wounded animals.
- Thermal binoculars or cameras may assist with confirming insensibility and shot placement after an animal has collapsed.
- To minimise the risk of dependent fawns being missed, they should be targeted first.

- If female deer are shot, efforts should be made to find any dependent young and kill them quickly and humanely.
- Aerial shooting programs must be highly accountable. Apart from maintaining maximised animal welfare standards, records should be kept of number and location of animals killed, number of animals injured (not killed) and their outcome, hours flown, ammunition used, and other procedures.
- The use of suppressors or sound moderators, where jurisdictional legislation permits, can help to minimise disturbance to other feral deer in the area.

Impact on non-target animals

- Shooting is target specific and does not usually impact other species. However, a risk of injuring or killing non-target animals, including livestock, may occur if shots are taken before an animal has been positively identified. This risk is minimised by:
    - confirmation of target species must occur between at least two members of the flight crew before engaging the target.
- Sensitive livestock such as horses and pets may be frightened by gunshots, helicopter rotor noise, and downwash from the helicopter. These animals may injure themselves by running into fences or other obstacles. Pest programs should avoid shooting in areas where livestock occurs or organise their removal from the area prior to the shooting program.
- Thermal equipment may also improve detectability of animals, which may reduce pressure on non-target animals and livestock. The improved detectability using thermal equipment does vary with the quality of equipment being used.
- The use of suppressors or sound moderators, where jurisdictional legislation permits, can help to minimise disturbance to non-target animals in the area.

HEALTH AND SAFETY CONCERNS

- Aerial shooting operations must comply with the CASA requirements and jurisdictional work, health and safety legislation.
- Aerial shooting requires safety protocols to be strictly followed. Each team member must be trained and briefed on helicopter and firearm safety.
- The helicopter pilot must give a pre-flight briefing to all personnel to establish communication protocols including:
    - pre-shot manoeuvres
    - commands for firing
    - emergency procedures.
- Shooting from a helicopter can be hazardous, particularly in rugged areas. The combination of low-level flight, proximity to obstacles (trees, rocks, wires), and the use of firearms makes this activity high-risk. The risks are mitigated through:
    - adhering to an approved ‘aerial shooting safety management plan’ (ASSMP) or similar jurisdictional documents.
    - appropriate training and experience of all personnel (helicopter crew and shooter)
    - approval from landholders to undertake shooting on their property, reminders to landholders of when the shooting will occur, and notifying neighbours
    - mapping of shooting zone, buffers, and no-shoot zones
    - clear communication among flight crew

    - daily reviews of operations
    - risk assessments and operational reviews.
- Ejected ammunition must not interfere with the safe operation of the helicopter. Some jurisdictions require the fitting of a deflector plate or case catcher to the firearm.
- When not in use, firearms and ammunition must be securely stored in a manner that meets jurisdictional requirements.
- Firearms are not loaded until the helicopter is in the air and approval is given by the pilot.
- Approved helmets and hearing protection should be worn by the shooter and others in the helicopter.
- Safety glasses, or visors attached to the helmets, may be used to protect the eyes from gases and metal fragments.

EQUIPMENT REQUIRED

The following equipment is required for conducting aerial shooting operations.

Firearms and ammunition

- Firearms that will cause death of the target animals, such as rifles or shotguns will be used. The type of firearm used is at the discretion of the shooter and based on jurisdictional and operational requirements and deer species and sizes to be culled.
- The firearms must be used in accordance with CASA requirements including CASR Part 91 (general operating and flight rules), Part 92 (consignment and carriage of dangerous goods by air) and Part 138 (aerial work operations).
- Self-loading (semi-automatic) firearms are preferred, because they allow for rapid reengagement to deliver a second or subsequent follow-up shot to the target animal.
- Shotgun and rifle may be interchanged to allow for variability to suit the situation.
- When using a shotgun the minimum requirement is for a 18 inch barrel with ¾ - full choke.
- Firearms may be fitted with a red dot scope, appropriate low magnification telescopic sights, open/iron sights, red dot scope, or thermal scope.
- Shooters should select ammunition that best suits the species being targeted to achieve the humane kills. Recommended ammunition types and their capabilities are listed in Tables 1 and 2.
- Shooters should have a backup firearm on board the aircraft in case of firearm/ammunition malfunction and equipment to conduct repairs.
- The firearms need to be reliable, and well maintained.
- The accuracy and precision of firearms should be test fired before operations as well as checking the ejection of empty cartridge cases from the firearm is suitable for aerial operations.
- The shooters must ensure there is adequate amount of ammunition and loaded magazines prior to the commencement of each flight.

Table 1 Recommended minimum cartridge and distance requirements for rifles used in feral deer operations

Cartridge	Bullet weight (gr)	Max. distance (m)	Situation	Species
.308 Winchester	130	150	Open ground to dense vegetation	All species (individual animal sizes should be taken into consideration)
.308 Winchester	135			
.308 Winchester	150			
.308 Winchester	180			

Table 2 Recommended minimum cartridge and distance requirements for shotguns used in feral deer operations

Cartridge	Number of Pellets	load (gram)	Max. distance based on effective spread pattern of the projectile (m)	Situation	Species
Buckshot no. 00 (.33)	9	36-42	25	Open ground to lightly vegetated area	All Hog, Fallow, and Chital Deer Red or Rusa Deer to adult female size
Buckshot no. 00 (.33)	12				
Buckshot no. 1 (.30)	16				
Buckshot no. 2 (.27)	21				

Aircraft

- Aircraft used for aerial shooting should be manoeuvrable, fast, and responsive to allow quick follow-up of any wounded animals; it should also provide a stable platform for accurate shooting.
- Factors that may influence the type of aircraft being used in an aerial shooting operation include jurisdictional requirements, aircraft type capabilities, operational requirements, terrain, and number of personnel on board.
- GPS (global positioning systems) and computer mapping equipment with appropriate software may be used to assist in the accurate recording of information (e.g., where animals are shot, flight heights etc.) and to reduce the risk of shooting in off-target areas.

Other equipment

- Flight helmet (with intercom)
- Fire-resistant flight suit
- Safety harness
- Lace-up boots, gloves, and appropriate eye and hearing protection
- Survival kit (including a first aid kit)
- Emergency locating beacon
- Lockable ammunition box
- Suppressors/sound moderators where jurisdictional legislation permits
- Thermal cameras with a high refresh rate (>50 Hz); thermal binoculars/monocular with appropriate tether.

WEATHER CONDITIONS

- Weather conditions need to be checked, prior to take-off. Weather conditions are taken from the closest station to the intended working area or real-world observations from the flight crew and on-ground staff posted at the area of operation.
- The pilot has the final say in determining if it is safe to fly in the weather conditions.
- Thermal imaging is most effective under certain environmental/weather conditions e.g. cooler air and ground temperatures and increased cloud cover.

PROCEDURES

- The pilot and shooters must only shoot feral deer on land where the land manager has given permission for shooting.
- Shooters must not shoot at an animal unless they are confident of a kill. Only chest (heart-lung) or head/brain shots must be used.
- When a target is positively identified, the pilot should position the helicopter as close as is safe to the target animal for a humane kill.
- The pilot should make the shooting platform as stable as possible.
- Where target animals are encountered in a mob, they should typically be shot from the back of the mob first. If this is not possible, the pilot and shooter need to communicate so they focus on the same animal Each animal must be shot at least twice, with at least one bullet placed in the heart/lung, before shooting other animals.
- The shooter must shoot an animal more than twice in the following circumstances:
    - where directed by the pilot
    - if the shooter considers it necessary
    - until a bullet is placed in the heart/lung of the animal
    - if the animal doesn't appear dead. Signs of life could include attempting to lift its head, any coordinated body movement, eye blinking or breathing.
- Each animal shot must be considered dead, with no signs of life, and verbally announced by two-crew as a "kill" before engaging another animal. Signs of life could include attempting to lift its head, any coordinated body movement, eye blinking or breathing.

- A flyback procedure is required after shooting a mob of feral deer. The procedure is to:
    - flyback over each animal shot
    - hover over each animal long enough to confirm that it has no sign of life
    - if the shooter or pilot have any doubt as to whether the animal is dead, the shooter is to shoot into the heart/lung area.
- If feral deer are detected in thick or tall timber making engagement difficult, pressure can be applied to move feral deer. Pursuit times and techniques used should considered to minimise the stress on target animals.

Target animal and shot placement

Aiming points for head and chest shots are as follows (illustrated in Figure 1 and Figure 2)

Chest Shot

Side view

The firearm is aimed at the centre of a line encircling the minimum girth of the animal's chest, immediately behind the forelegs. The shot should be taken slightly to the rear of the shoulder blade (scapula). This angle is taken because the scapula and humerus provide partial protection of the heart from a direct side-on shot.

Head Shots

Poll position (rear view)

When aerial shooting, most head shots will be taken at this position as animals are running away from the helicopter. The firearm should be aimed at the back of the head at a point between the base of the ears and directed towards the mouth.

Temporal position (side view)

This shot is occasionally used where a second shot needs to be delivered to an injured animal that is lying on its side. The deer is shot from the side so that the bullet enters the skull at a point midway between the eye and the base of the ear.

Frontal position (front view)

This position is occasionally used when an animal faces the shooter. It should not be used for larger adult deer due to the heavier bone structure of the front of the skull. The shot is directed at a point of intersection of lines taken from the base of each ear to the opposite eye.

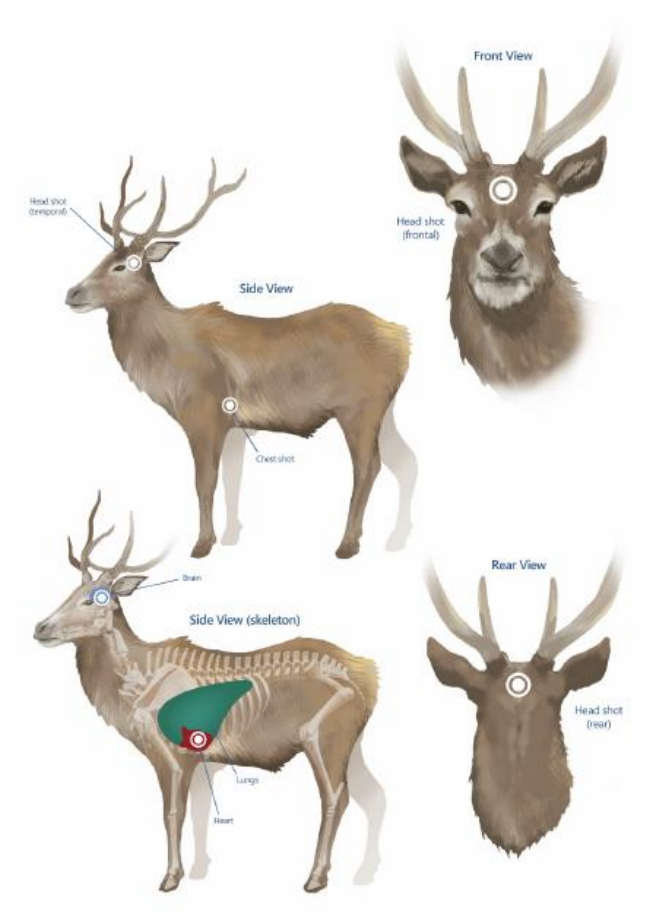

Figure 1 Shot placement for aerial shooting of deer.

Note that shooting an animal from above or below the horizontal level as depicted here will influence the direction of the bullet through the body. Adjustment to the point of aim on the external surface of the body may need to be made to ensure that the angled bullet path causes extensive (and therefore fatal) damage to the main organs in the target areas.

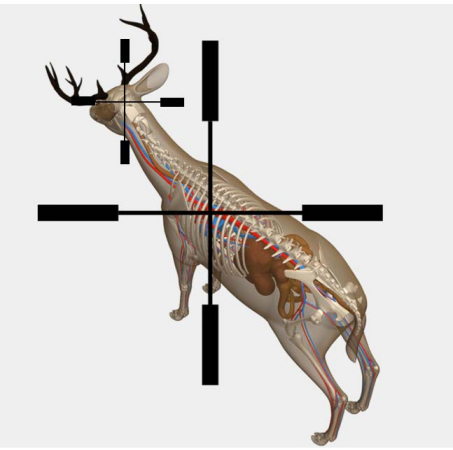

Figure 2 Shot placement for aerial shooting of deer - aerial view.