



Department of
Parks and Wildlife



Standard Operating Procedure

Humane killing of animals under field conditions in wildlife management

SOP No: 15.1

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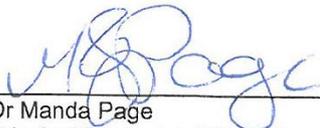
DPaW Animal Ethics Committee

Version 1.0 (June 2013)

Revision History Log			
Version #	Revision Date	Author	Changes
1.0	06/07/2012	Rebecca Kay	Created and drafted document
	18/07/2013	Rebecca Kay	Approved

Approvals

Version 1.0

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Acknowledgements

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Advice for compiling the content of this standard operating procedure was sought from: Manda Page, Christine Groom, Kirsty Dixon, Mark Blythman, John Rooney, Neil Thomas, Doug Coughran, Colleen Sims, Tim Hyndman (Murdoch University), Lisa Winters (Murdoch University), Jordan Hampton (Ecotone Wildlife).

This document has been reviewed by the DPaW Animal Ethics Committee.

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1 Purpose

This standard operating procedure (SOP) provides advice on the humane killing of animals under field conditions. Department of Parks and Wildlife (DPaW) personnel conduct biological surveys, fauna monitoring programs, captive breeding programs, translocations and introduced predator control. They also handle sick, injured, orphaned and confiscated fauna. This document is intended as an operational guide to facilitate appropriate humane killing practices, and ensure that animals do not suffer unnecessarily. The humane killing of animals may be required for a number of reasons including;

- Emergency euthanasia of animals with untreatable injuries or illness/disease where an animal may be suffering.
- As a requirement of a research procedure or vouchering purposes.
- Destruction of live-captured declared pest animals where release is prohibited.
- Diagnostics and disease screening for emerging diseases/zoonoses.

This standard operating procedure provides advice on the humane killing of animals in fauna research and management under field conditions only.

2 Scope

This standard operating procedure applies to all activities involving fauna undertaken across the State by the Department of Parks and Wildlife (DPaW). It may also be used to guide fauna related activities undertaken by NRM groups, consultants, researchers and any other individuals or organisations. All DPaW personnel involved in fauna research and management should be familiar with the content of this document. The methods described in this document have been designed for field conditions only.

DPaW personnel who work with fauna must have a good understanding of the relevant sections of the *Occupational Safety and Health Act 1984*, *Animal Welfare Act 2002*, *Wildlife Conservation Act 1950 (WA)*, and the *Environment Protection and Biodiversity Conservation Act 1999*. DPaW personnel must also comply with the *Australian code of practice for the care and use of animals for scientific purposes* under the provisions of the *Animal Welfare Act 2002*. In Western Australia any person using animals for scientific purposes must be covered by a licence issued under the provisions of the *Animal Welfare Act 2002*, which is administered by the Department of Agriculture and Food, Western Australia. A copy of the Code may be viewed by visiting the National Health and Medical Research Council website (<http://www.nhmrc.gov.au/>).

Please note: Projects involving wildlife research require a licence to take (i.e. capture, collect, disturb, study) fauna for scientific purposes (Reg 17) under the provisions of the *Wildlife Conservation Act 1950 (WA)*. Other licences may also be applicable and care should be taken to ensure that the appropriate licences and permits are adhered to when planning any project. All projects that involve working with fauna must be approved by the DPaW Animal Ethics Committee (AEC).

3 Definitions

Animal handler: A person listed on an application to the DPAW Animal Ethics Committee that will be responsible for handling animals during the project.

Anoxia: A lack or absence of oxygen.

Caudally: Of or towards the posterior part of the body.

Cervical: Relating to the neck.

Euthanasia: Rapid loss of consciousness, followed by death, with a minimum of pain or distress.

Intraperitoneal: Referring to injection into a specific site in the abdominal body cavity.

Intravenous: Within a vein.

Neonate: A newborn, up to four weeks old.

Point Blank: 0.1m – 2m brain shot via firearm.

Temporal: Pertaining to or situated near the temple or temporal bone of the skull.

Ventral: Pertaining to the venter or belly; abdominal.

Zoonoses: Any infectious disease transmitted to humans from contact with animals.

4 Deciding when humane killing is necessary

In most situations the decision to humanely kill an animal must be based on the perceived degree of suffering and the chances of recovery. If an animal is severely injured and is suffering, it must be relieved of its suffering as soon as possible. The goal of using humane killing techniques is to produce a painless, rapid death and to avoid exciting or alarming the animal. The technique used should be as reliable, simple, safe and effective as possible. Animals should be euthanased in a quiet area, away from other animals, as distress signals from a sick or injured animal may cause fear and distress for others within audible reach.

Your safety and the safety of co-workers and volunteers is first priority. The procedure should only be performed by competent persons and should not cause undue stress to human observers. It should be conducted away from members of the public wherever possible, but doing so should not add additional distress to the animal. Humane killing should be carried out giving due consideration to the following factors in order of priority:

- Human safety
- Animal welfare
- Practicality
- Skill
- Aesthetics

DPaW fauna research projects must have an emergency euthanasia action plan developed for that project, identified and endorsed in the AEC application. This action plan should identify and address all potential situations where emergency euthanasia may be required as part of the tasks and duties to be undertaken by personnel and the protocol assigned to manage individual situations. All staff must be aware of the agreed action plan prior to undertaking field work. Where unforeseen situations occur that are not designated under an action plan, general guidance for decision making is described below.

The first step is deciding whether the humane killing of an animal is necessary in a situation and although there may be many different circumstances under which a decision process is carried out, generalised guidance criteria are provided below (Figure 1).

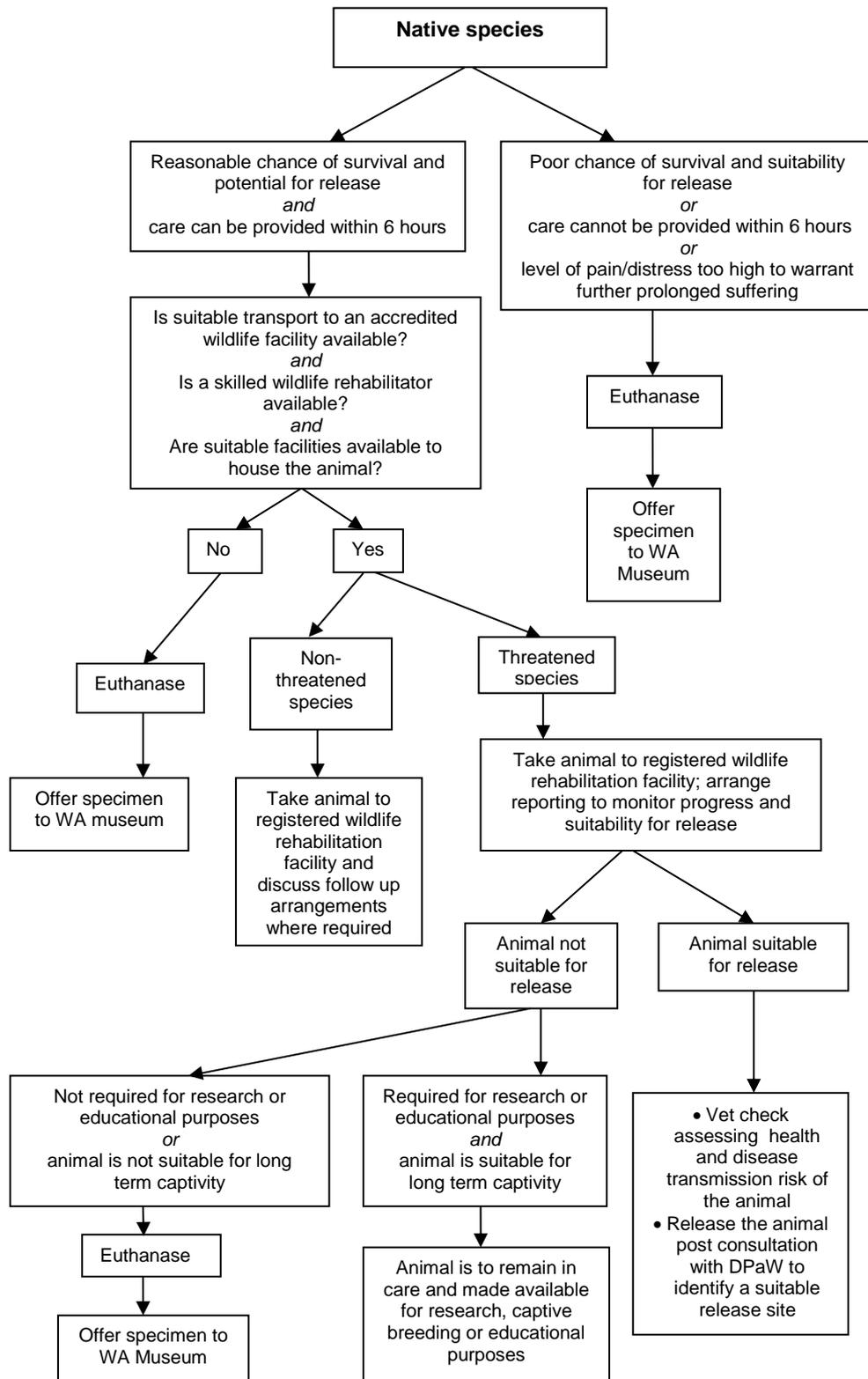


Figure 1: Decision making chart for sick, injured or orphaned fauna.

For a list of species declared as 'threatened' in Western Australia under the *Wildlife Conservation Act 1950* refer to the DPaW Listing of species and ecological communities - (<http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities>).

Note: Non-native pest species must not be released back into the wild. For further information go to http://www.agric.wa.gov.au/PC_93045.html. Contact the nearest office of the Department of Agriculture, or telephone Free call 1800 084 881 for advice regarding the appropriate fate of vertebrate animal pests.

5 Process for humanely killing an injured animal

If an injured animal requires emergency euthanasia, the most appropriate method will depend on a number of factors:

- The animal species and age grouping.
- Severity of the injury and overall stress level of the animal (i.e. can the animal be safely handled and transported, is immediate euthanasia required).
- Available transportation and time (i.e. distance to a veterinary clinic or wildlife rehabilitation facility, is appropriate transportation equipment on hand).
- Location (e.g. proximity to people and infrastructure in relation to firearm safety).
- Practicality of the method in regards to the nature of the animal and the situation, and presence of appropriately experienced personnel (i.e. can the animal be safely handled and chosen methods safely administered).

Expert judgement will be required to determine the most appropriate means to proceed and the suitability of the methods present below in individual circumstances will be at the discretion of the Chief Investigator of the project.

First point of contact to assist in decision making:

- DPaW Science Division
- Registered fauna rehabilitation facility. DPaW assist to direct fauna enquiries through the Fauna Helpline WILDCARE: (08) 9474 9055 (24 hrs) and may be able to connect you to the nearest registered rehabilitation facility

Alternatively you may be able to contact the following for assistance at their own discretion:

- Perth Zoo Veterinary Department (PH: 0439 953 026)
- Local veterinarian
- Landowner (use of firearm in the case of a severely injured animal)

Upon deciding it is necessary to humanely kill an animal, the preferred methods are dependent upon the species, size, age and state of the animal, the availability of equipment and the competency of personnel present in the application of euthanasia techniques. Procedures preferentially are performed by a person competent in, or qualified for, the method to be used, or under the supervision of a competent person. The methods recommended regarding the practice of humanely killing animals for various field situations described in this standard operating procedure include:

- Injectable chemical agents (lethal injection)
- Shooting via firearm
- Blunt force trauma
- Cervical dislocation

Further details regarding the appropriateness and circumstances under which each is carried out are described in detail in the following sections. There are numerous methods not described in this SOP which can generally be considered as either unsuitable for field conditions in the context of this document or not acceptable. There are however situations in which alternate methods not described here may be valid upon approval by the DPaW AEC and alternate methods are not explicitly excluded. For example, there are continual advances in specialised equipment such as captive bolt mechanisms that may be suitable for use in field conditions.

The use of either Injectable chemical agents or firearms (where considered appropriate to the situation in question) are the preferred methods for humanely killing animals where the required accreditation, equipment and personnel skills are available and the limitations of each method have been considered in decision making (as guided in Table 2). Lethal injection is usually the most desirable method when it

can be performed without causing fear or distress in the animal (AVMA 2013) however; this is often difficult when working with wild animals. Where nobody experienced in humane euthanasia is able to attend and you are able to approach the animal, prevent its escape and feel comfortable to do so, a blow to the head by blunt force trauma (described in Section 6.3) is the preferred form of euthanasia where there are no other valid options available.

Note that this general guidance will not conform to all situations and all incidents must be assessed on an individual basis.

Dependant offspring of the animal/s receiving emergency euthanasia must also be euthanased unless care can be provided for them (refer to Figure 1). This would require planning for the care and subsequent release of the animal in regards to time and resources required to ensure its suitability for release; and an appropriate designated release site. For further information refer to *SOP 14.1 Care of evicted pouch young*.

6 Humane killing techniques for field conditions

Ideally either injectable chemical agents or firearms should be used to humanely kill animals wherever possible. However, if the equipment required is not on hand, trained personnel are not available to carry out these techniques or the condition/characteristics of the animal and/or field environment do not favour the accurate and successful application, then alternate methods must be used. The methods for the humane killing of animals outlined below and in the following tables are based on laboratory testing and DPaW experience to establish the most humane and ethical methods of euthanasia under field conditions (adapted from Reilly 2001). Table 1 is designed as a quick overall reference summary. **The table must never be used in isolation and must be used in conjunction with the explanatory information that follows. Note that the information contained in this SOP is general guidance only.**

Table 1: Recommended techniques for the humane killing of common animals adapted from Reilly (2001).

Technique: <input checked="" type="checkbox"/> Recommended <input type="checkbox"/> Not recommended <input checked="" type="checkbox"/> Not acceptable				
Species	Lethal Injection	Shooting	Blunt trauma	Cervical dislocation
<i>Small mammals e.g. bats, mice and rats</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Must be under 150g
<i>Medium sized mammal's e.g. chuditch, bandicoots and rabbits</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Must be under 150g (young only)
<i>Dingoes, dogs, foxes and cats</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Must be under 150g (young only)
<i>Kangaroos and wallabies</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Brain shot preferably, heart shot acceptable	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Must be under 150g (pouch young only)
<i>Birds</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Medium and large sized birds only	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Small and medium sized birds
<i>Lizards and snakes</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Fresh water turtles</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Marine turtles</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Brain shot only	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Crocodiles</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Brain shot only	<input checked="" type="checkbox"/> Juveniles only	<input checked="" type="checkbox"/>
<i>Amphibians</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

<i>Fish</i>	☐	☐	☑	☑ Small fish only
<i>Cetaceans, sirenians and pinnipeds</i>	☒	☑ Brain shot only for small species (<6m length) ☑ Explosives for large species (>6m in length)	☒	☒

As part of decision making regarding the most appropriate method to use in a given situation, there are a number of factors associated with each method that should be considered and mitigated where possible (Table 2).

Table 2: Qualitative comparison of recommended euthanasia methods.

	Lethal Injection	Shooting	Blunt Trauma	Cervical Dislocation
<i>Level of training and certification</i>	high	high	low	medium
<i>Specialised equipment & costs</i>	high	medium	low	low
<i>Relative time to death from commencement of procedure</i>	Potentially prolonged considering handling and sedation is first required	Instant assuming placement of an accurate shot	Instant provided the animal is able to be approached and struck quickly	Potentially prolonged considering handling is first required
<i>Stress to the animal</i>	Potentially high pre-sedation during handling	Low assuming placement of an accurate shot	Low if stress as a result from approaching the animal directly can be avoided	Potentially high during handling
<i>Level of risk/hazard to personnel health & safety</i>	high	high	low	Low
<i>Level of amenity & distress to personnel & the public</i>	low	medium	high	low

6.1 Injectable chemical agents (lethal injection)

This involves administration of a barbiturate overdose either by the intravenous, intracardiac or intraperitoneal routes. Barbiturates are able to depress the central nervous system leading to death following ceased breathing and heart function. Injectable solutions of Sodium Pentobarbitone (Lethabarb) can be used for humane euthanasia of most vertebrates however its use as a sole agent is often restricted in its applicability to certain groups of species in field situations as a result of safety and practicality factors. Refer to Table 1 for general guidance on the suitability of lethal injection for a selection of common species. Administration of injectable chemical agents is a specialised method of euthanasia that requires significant training, particularly for use in field situations.

Administration of a sedative such as Zoletil is first required as Lethabarb is painful when injected outside a vein. Sedation is essential to reduce stress to the animal and eliminate potential pain while allowing the operator to accurately administer the injection. The most efficient route for the injected solution to enter the blood stream is via the intracardiac and intravenous methods. Injection by the

intraperitoneal route is the least desirable method and is generally used when an intravenous injection would result in stressful handling (dangerous to the animal and/or operator), when there are no accessible veins or where the condition of the animal and/or the field environment does not favour accurate and successful administration. Accurate administration of this method, particularly in regard to intracardiac and intravenous variants, is highly technical and requires significant training and experience. Expertise is also required to inform under what conditions and for what species a given method will be suitable. It is also very important to ensure confirmation of death; that the technique has been performed correctly and that the animal has not simply been sedated without being euthanased. It is therefore preferable that such methods are administered by a qualified veterinarian.

DPaW personnel seeking to use this method must be trained in the correct dose rates and injection techniques, storage and safety procedures. Euthanasia solutions can only be administered by DPaW personnel who have satisfied the applicable permit requirements of the Western Australian Department of Health (DoH) and Veterinary Surgeons Board (VSB). A permit from the DoH is required for storage of S4 drugs (scheduled prescription only medicine or prescription animal remedy). Storage facilities must be registered and lock secured. Such drugs must also be securely locked in a container during transport.

6.2 Firearms

Shooting is a quick and effective means of humanely killing animals and commonly the most practical method in field situations, particularly where animals cannot be safely handled and restrained. Shooters can euthanase an animal from a distance, and assuming the placement of an accurate shot; produces an instant or rapid death.

Shots must be aimed so that the projectile enters the brain or heart, causing instant loss of consciousness. The shooter must always aim for a brain shot, a heart shot is only justifiable where the accuracy required for a brain shot cannot be achieved or where there are diagnostic considerations (e.g. taxonomic studies). Diagrams illustrating points of aim for the brain shot (and heart shot if required) are described for common species in Appendix II. **Note that shooting is generally only suitable for larger animals.**

Shooting requires specialised equipment and must only be carried out by the holder of an appropriate firearm licence. DPaW employees must complete DPaW's Firearms Training Course and be on the DPaW Firearms Register. A guide to the recommended firearms, calibre and shot specifications for the ethical and humane shooting of common animals are shown in Appendix I.

Firearm users must strictly observe all relevant safety guidelines relating to firearm ownership, possession and use. All people should stand well behind the shooter when an animal is being shot and the line of fire chosen should prevent accidents or injury from stray bullets or ricochets. Animals must not be shot from a moving vehicle or platform. The animal must be clearly visible, stationary, within the appropriate range and shot using the appropriate calibre and cartridge specifications (see Appendix I).

Note: the final choice of minimum calibre and shot size/type may depend on the known behavioural characteristics of the species (e.g. wary vs. approachable, ground forager vs. canopy forager for birds). Further specialist training in addition to the DPaW firearms training course is required for the destruction of marine species. The firearm specifications and techniques described in Appendices I & II are a guide only and do not cover all species. Species specific research should be undertaken and expert advice sought as part of a euthanasia action plan to determine the most appropriate shooting method prior to undertaking field work.

6.3 Blunt force trauma

This is a hard, sharp blow to the base of the back of the skull with a blunt metal or heavy wooden bar. Blunt trauma is mainly recommended to humanely kill reptiles, amphibians and small to medium sized mammals. This method should only be utilised where the person has some experience in the practice of blunt trauma, feels comfortable in carrying out the technique and may be followed by a secondary method of euthanasia where appropriate (e.g. cervical dislocation, decapitation) if there is uncertainty as to final death.

The anatomy of the skull varies greatly between species and some will require more force than others to be an effective and humane method. The operator must be confident of performing the technique quickly and effectively. This method should not be used where the behaviour of a stressed animal will impede the operator carrying out the method quickly and effectively.

Note: this method can lead to undesirable damage to key body parts that are important for taxonomic studies. If the head must be preserved intact, for scientific purposes, an alternative technique should be used. Refer to *SOP 8.1 Vouchering vertebrate fauna specimens* for further guidance.

6.4 Cervical dislocation

Cervical dislocation leads to separation of the skull and the brain from the spinal cord by pressure applied posterior to the base of the skull, damaging the brain stem which controls respiration and heart activity. This is an acceptable method for small animals that are easily handled (e.g. small to medium sized birds or mammals up to 150g). Some consideration should be given to the cervical anatomy and degree of musculature when assessing if it is appropriate for the animal in question which requires training gained under the supervision of more experienced personnel.

It involves holding the animal prostrate on a solid surface with the thumb and forefinger of the operator firmly squeezing the neck behind the head of the animal. The hindquarters are grasped firmly with the free hand and pulled caudally away from the head. An instrument such as scissors or a steel rod can be used in place of the thumb and forefinger. For birds, the legs are taken in the left hand and the head held between the first two fingers of the right hand with the thumb under the beak. A sharp jerk with each hand, pulling in directly opposite directions will break the spinal cord and carotid arteries.

The operator must be confident of performing the technique quickly and effectively. Cervical dislocation should only be performed by a person experienced in the technique for that species. This method should not be used where the behaviour of a stressed animal will impede the operator carrying out the method quickly and effectively.

6.5 Confirmation of death

After administering euthanasia, **it is essential to establish that the animal is dead before disposing of the carcass.** This can be difficult for some animals such as reptiles and amphibians. Several signs can be used to establish that death has occurred including:

- absence of breathing;
- no corneal reflex or response by the eyelid (where applicable) when stimulated and glazing of the eyes;
- absence of a heart beat and a pulse;
- loss of colour (changing from pink to white or grey/blue) in the mucous membranes.

If there is any doubt about confirmation of death, a secondary euthanasia method should be used to ensure the animal is dead.

6.6 Preservation and/or disposal of dead animals

Guidance for the preservation of animals for post-mortem, pathology testing and DNA analysis is provided below. If not required for scientific purposes, dead or euthanased animals should be offered to the Western Australian Museum which holds the research collection forming the basis of our understanding of the state's biodiversity. Detailed information regarding the vouchering of specimens can be found in *SOP 8.1 Vouchering vertebrate fauna specimens*.

Pathology and post mortem

- Refrigeration is often the most practical preservation method and is sufficient where the specimen can reach a veterinarian for examination within 48 hours. Refrigeration may be particularly useful where the entire body of a larger animal requires examination and preserving fluid is impractical. The body of the animal can be wrapped in newspaper and placed in a well labelled plastic bag prior to chilling.
- Formalin is the ideal preserving fluid, particularly where examination of a specimen is likely to be delayed beyond 48 hours. **Note formalin is hazardous.** It requires careful handling and containers etc. used to hold samples must be well labelled. Tissue samples can be placed in a volume of 10% buffered formalin solution equal to at least ten times the tissue volume to ensure adequate preservation. Due to the hazards involved in handling this substance it is most practical for the entire body of small specimens or samples taken from larger specimens.

DNA analysis

- 100% ethanol is most efficient where DNA analysis is required. The body cavity must be opened along the ventral mid-line to allow the preservative to penetrate the internal organs and the animal must be immersed in about five times the volume of the specimen. 70% ethyl alcohol (a mix of seven parts methylated spirits to three parts water) will suffice in most cases for small specimens if ethanol is not available.

If the specimen is not required for the Western Australian Museum collection or other scientific purposes, the body should be either buried at an appropriate site or disposed of at an approved refuse disposal site or via a veterinary clinic. **Dead animals carry and shed infective agents, so appropriate care and hygiene must be maintained during handling, storage and transport of specimens and carcasses (refer to SOP 16.2 Managing disease risk in wildlife management).**

If burying a carcass, ensure it is buried sufficiently to prevent scavenging. The recommended minimum depth of burial is 1 m. Where secondary poisoning may be a potential risk to other fauna (i.e. where injectable chemical agents have been used) or other disease risks apply, it may be necessary to incinerate the carcass or cover it with lime before burial. Contact the Local Government Authority to arrange disposal of animal's euthanased on Shire land.

7 Level of Impact

The impact of the above humane killing procedures on fauna should be low where experienced personnel are available to carry out techniques correctly. Incorrect or inappropriate use of the above techniques can potentially result in a high level of impact and care should be taken to minimise the level of impact where possible.

Potential impacts include:

- Distress to animals during handling (refer to *SOP 10.2 Hand Restraint of Wildlife* for further guidance).
- Pain (where a technique is administered incorrectly or ineffectively).
- Physical injury to the animal (in trying to restrain an animal or an animal causes itself further harm as a result of distress).
- Transmission of infectious agents to animals as result of poor hygiene practices (see *SOP 16.2 Managing disease risk in wildlife management*).

Ineffective attempts to humanely kill an animal can potentially promote high levels of stress and suffering.

Where personnel are not equipped to perform the appropriate humane killing method correctly, or do not feel comfortable in carrying out the action, it is best to leave the animal to avoid increased stress and suffering. Pre planning and application of an emergency euthanasia action plan is essential as an effective mechanism for avoiding such situations.

8 Ethical Considerations

To reduce the level of impact of emergency euthanasia on the welfare of animals, there are a number of ethical considerations that should be addressed by personnel throughout projects potentially involving these procedures. DPaW projects involving fauna will require approval from the DPaW Animal Ethics Committee and the following ethical considerations must be adequately covered in any Application for Approval to Undertake Research Involving Vertebrate Animals.

- An emergency euthanasia action plan must be incorporated in the pre-planning of any field based projects and personnel with adequate training and experience must be present when carrying out field based duties.
- All animal deaths (emergency euthanasia and unassisted) and injuries should be recorded and communicated to the Chief Investigator of the project.
- Unexpected euthanasia incidents should be reported to the AEC immediately following the incident (or at the soonest opportunity) by completing the Unexpected Death or Emergency Euthanasia form, available on the DPaW AEC Intranet website.
- Chief Investigators must provide statistics of all animal deaths and injuries in annual reports submitted at the end of the year or at the completion of a project.

8.1 People

The public can be a major hazard to the safety of the animal, personnel and themselves. Where possible, humane killing of an animal should be conducted away from members of the public. Only personnel who need to be directly involved should remain in the immediate vicinity.

8.2 Animal Handling

To ensure minimal stress to animals they should only be handled for as long as required to assess the animal (where disease is suspected) and determine a decision outcome. Improper restraint, especially when dealing with a stressed and frightened animal, can lead to major physiological disturbances (hyperthermia, stress, shock capture myopathy). Refer to *SOP 10.1 Animal handling/restraint using soft containment* and *SOP 10.2 Hand restraint of wildlife* for further guidance.

8.3 Hygiene

Good hygiene practices must be maintained to reduce the risk of spreading pathogens between animals and between sites. Refer to *SOP 16.2 Managing disease risk in wildlife management* for further information.

9 Competencies and Approvals

DPaW personnel, and other external parties covered by the DPaW Animal Ethics Committee, undertaking fauna related activities require approval from the committee and will need to satisfy the competency requirements detailed in Table 1. Other groups, organisations or individuals using this SOP to guide their fauna activities are encouraged to also meet these competency requirements as well as their basic animal welfare legislative obligations.

The humane killing of animals is required in a variety of situations, often by unexpected encounters, and may occur by a variety of methods as described previously. Table 3 details the competency requirements for use of specific methods as well as recommended competencies for personnel that are involved in fauna management and will likely be exposed to euthanasia practices in performing their duties.

Table 3: Competency requirements for the humane killing of animals

Competency Category	Competency Requirement	Competency Assessment
Formal experience, qualifications and course certificates <ul style="list-style-type: none"> - For use of drugs/injectable chemical agents - Use of firearms 	Applicable permits where required by the WA DoH and VSB DPaW Firearms Training Course	Training and written endorsement of competency in specified procedures by a veterinarian & completion of a DPaW Animal Ethics Committee approved euthanasia course Written verification and must be on DPaW's firearms register
General skills/experience <ul style="list-style-type: none"> - Manual techniques 	At minimum - have been shown how to perform one of the above described methods by an experienced person to carry out the humane killing of an animal Experience under an experienced supervisor/Chief Investigator for each technique	At least 2 weeks field experience under the supervision of a person experienced in euthanasia techniques, successfully demonstrating the specified technique in at least two instances for each specified species. In emergency cases – At least some form of training & assessment in the specific technique by a person trained in the technique for at least 5 years DPaW staff require a letter of competency specifying the range of techniques and species to which their experience extends

10 Occupational Health and Safety

A first aid kit should always be carried in your vehicle. You should be aware of your own safety and the safety of others as well as the animals during wildlife management activities. Wear practical dress attire and footwear, beware of zips and buttons on clothing, do not wear exposed jewellery likely to become caught in equipment.

It is recommended that a job safety analysis be undertaken prior to commencing any fauna related activities. The possibility of euthanasia being required and the risks associated with this should be incorporated. This safety analysis should include the following considerations.

10.1 Manual handling

Manual handling is generally often an integral part of humanely killing animals and the risk of injury to the animal and personnel is increased where an animal is stressed and/or in pain. Personnel must have experience when carrying out techniques such as cervical dislocation and blunt force trauma to humanely kill an animal. Personnel must also be trained in the appropriate manual handling techniques for the hand restraint of animals especially where personnel are directly involved with

fauna as part of their duties.

10.2 Animal bites, stings and scratches

Care should be taken when handling animals to avoid bites, stings or scratches and personal protective equipment (PPE) should be worn where required. Consideration should be given to PPE that may be relevant for the types of animals likely to be handled and provisions made to ensure that equipment is accessible. All inflicted injuries (even superficial ones) should be appropriately treated as soon as possible to ameliorate possible allergic reaction, prevent infection and promote healing. Field personnel should be aware of the treatment for snakebite and carry appropriate pressure bandages. A fully stocked first-aid kit should be carried in the field at all times.

Personnel should also have up-to-date tetanus vaccinations. DPaW personnel must not handle bats unless fully vaccinated against Australian Bat Lyssavirus.

If DPaW personnel or volunteers are injured an "Incident and Near Hit Notification" form must be completed and forwarded to DPaW's Risk Management Section.

10.3 Allergies

Some personnel may develop allergies when they come in contact with animal materials such as hair and dander or if bitten by invertebrates (e.g. tick bites). Personnel known to develop allergies should wear gloves, long sleeved shirts and long pants when handling animals.

People with severe allergies associated with animals, with immune deficiency diseases or on immunosuppressant therapy should not engage in the handling of fauna.

It is the responsibility of any person who has known allergies to carry the appropriate medication at all times and to notify the person in charge of field work of their allergy and the appropriate treatment in emergency situations.

10.4 Zoonoses

DPaW personnel must take precautions to minimise the risk of disease transmission to protect themselves, their families (children, the elderly and pregnant women are particularly vulnerable to zoonoses) and fauna populations. Care must be taken when handling live animals and carcasses as they may carry diseases that can affect humans and other animals e.g. hydatidosis, sarcoptic mange, leptospirosis, Q fever, brucellosis, sparganosis, melioidosis etc. Routinely wash hands after handling all animals and follow the procedures described in *SOP 16.2 Managing disease risk in wildlife management*.

10.5 Use of firearms

All personnel using firearms should be registered on DPaW's firearms register and have completed DPaW's Firearms Safety Course. Firearms safety protocols are specified in the Firearms Safety Course Manual.

10.6 Chemicals

Personnel should be aware of the dangers of the chemicals they use in the field. Refer to Material Safety Data Sheets (MSDS) relevant to the chemical(s) being used.

Injectable agents

Personnel must be extremely careful of their own safety when administering lethal injection. Accidental self-injection requires immediate medical attention. Only personnel trained and accredited in this

technique should be present in the immediate vicinity of the animal.

Formalin

Personnel must be aware of the safety precautions for handling and storage relevant to this chemical as advised on the MSDS before use. Ensure contact with the skin and inhalation is prevented.

Ethanol

Samples stored in more than 70% ethanol or more than 50mL of total volume of alcohol must be transported via courier and labelled as Dangerous Goods (O'Meally & Livingston 2002). Samples stored in less than 70% ethanol or less than 50mL of total volume of alcohol can be transported via Parcel Post providing they are adequately sealed with parafilm wrapped around the cap.

11 Further Reading/Sources

The following SOPs have been mentioned in the advice regarding the humane killing of animals. It may be appropriate that the following SOPs are also consulted when proposing to undertake the humane killing of animals.

SOP 8.1 Vouchering vertebrate fauna specimens
SOP 8.4 Animal tissue sample collection and storage
SOP 10.2 Hand restraint of fauna
SOP 11.1 Transport and temporary holding of wildlife
SOP 14.1 Care of evicted pouch young
SOP 14.2 First aid for animals
SOP 15.4 Humane killing of cane toads in DPaw managed National Parks
SOP 16.2 Managing disease risk in wildlife management

The following institutions/links may be of assistance:

- Australian and New Zealand Council for the Care of Animals in Research and Teaching
<http://www.arc.gov.au/ncgp/sri/ansccart.htm>
- DPaw Firearms Safety Course Training Manual:
http://intranet/csd/People_Services/rm/Documents/Firearms%20Safety%20Course%20Manual.pdf
- National Health and Medical Research Council <http://www.nhmrc.gov.au/>
- NSW Office of Environment and Heritage (2011). Code of Practice for Injured, Sick and Orphaned Protected Fauna. NSW Government.
- WA Health - Public Health - Licences and permits for medicines and poisons
(http://www.public.health.wa.gov.au/2/1301/2/licences_and_permits_for_medicines_and_poisons.p
[m](http://www.public.health.wa.gov.au/2/1301/2/licences_and_permits_for_medicines_and_poisons.p)) accessed 17/06/2013.
- Veterinary Surgeons Board WA - <http://www.vsbwa.org.au/>

The following sources have contributed to the content of this document:

Agriculture Protection Board of Western Australia (APBWA) (1991). Ethics, animal welfare and operation guidelines for the humane shooting of pest animals. Infonote 8/91.

American Veterinary Medical Association (2013). AVMA Guidelines on Euthanasia.
<https://www.avma.org/KB/Policies/Documents/euthanasia.pdf> accessed 20/03/2013.

Animal Health Australia (2010). *Operational procedures manual: Destruction of animals* (Version 3.1). Australian Veterinary Emergency Plan (AUSVETPLAN), Edition 3, Primary Industries Ministerial Council, Canberra, ACT.

Chapman, T., Sims, C. and Mawson, P. (2011). Minimising Disease Risk in Wildlife Management. Standard Operating procedures for fauna translocation, monitoring and euthanasia in the field. 3rd Edition. Department of Environment and Conservation, Perth.

Coughran, D. K., Stiles, I. and Mawson, P. R. (2012). Euthanasia of beached humpback whales using explosives. *J. Cetacean Research and Management* **12** (1): 137-144.

Daoust, P-Y & Caraguel, C. (2012). The Canadian harp seal hunt: observations on the effectiveness of procedures to avoid poor animal welfare outcomes. *Animal Welfare* **21**: 445-455.

Department of Environment and Conservation. Firearms Safety Course Training Manual. Training Manual SROFS001A | RTD2125A v3 8.7.09.

Department of Environment and Heritage (DEH) (1998). *Code of Practice for the Humane Shooting of Kangaroos*. Environment Australia.

Department of Environment and Resource Management (DERM) (2007). Marine Fauna Strandings Technical Manual. Queensland Government.

Department of Primary Industries (2012). Standard Operating Procedure: Trapping of feral pigs using cage traps in Victoria. The State of Victoria.

Mawson, P. (1991). Ethics, animal welfare and the humane shooting of pest animals. Infonote 8/91. Vertebrate Pest Research Section. Agriculture Protection Board of Western Australia.

Natural Resource Management Ministerial Council (NRMMC) (2005). *Draft Code of Practice on the Humane Treatment of Captive and Wild Crocodiles*. Australian Government.

Natural Resource Management Ministerial Council (NRMMC) (2008). *National Code of Practice for the Shooting of Kangaroos and Wallabies for Non-commercial Purposes*. Commonwealth of Australia.

Natural Resource Management Ministerial Council (NRMMC) (2009). *Code of practice on the humane treatment of wild and farmed Australian crocodiles*. Australian Government.

National Health and Medical Research Council (2004). *Australian Code of Practice for the care and use of animals for scientific purposes*. 7th Edition. Australian Government Canberra.

Museum Victoria Animal Ethics Committee (2010). Manual of Standard Operating Procedures (SOPs) for the Ethical Use of Live Aquatic Animals- fishes, cephalopods (octopus, cuttlefish, nautilus, squid and their allies) and DPaWapod crustaceans (crabs, crayfish, lobsters, prawns, shrimps and their allies). Staff and Associates and Museum Victoria.
http://museumvictoria.com.au/pages/17688/museum_victoria_sops_aquatic_animals_aug2010.pdf?epslanguage=en accessed 06/07/2012.

O'Meally, D. and Livingston, S. (2002). Opportunistic collection of tissue in the field. Australian Museum, New South Wales.

Reilly, J.S. (Ed.) (2001). Euthanasia of Animals Used for Scientific Purposes. ANZCCART.

Sharp, J. and Saunders, G. (2004). GEN001 Methods of euthanasia. NSW Department of Primary

Industries.

Sikes, R.S., Gannon, W.L., and the animal care and use committee of the American Society of Mammalogist. (2011). Guidelines of the American Society of Mammalogists for the use of wild mammals in research. *Journal of Mammalogy* **92**(1): 235-253.

Tasker, L. (undated). Methods for the euthanasia of dogs and cats: comparison and recommendations. World Society for the Protection of Animals.

University of Notre Dame (2007). Institutional Animal Care and Use Committee Standard Operating Procedure for Euthanasia.

Rose, K. (2005). *Fauna Health Investigation Manual*. The Australian Registry of Fauna Health. Chapter 5, 95-111.

Winters, L. (2011). Euthanasia Dealing with a Difficult Situation- Workshop. Research Ethics Office, Murdoch University. Perth, Western Australia.

Appendix I Recommended minimum calibre and shot specifications for the use of firearms to shoot common species

The following information is modified from *DPaW's Firearms Training Course Manual* and APB (1991).

Species	0–5m (Head shot only)	5-30m	30-100m	>100m
Camel	.357 magnum	.357 Magnum	.308	.308
Donkey	.357 Magnum	.357 Magnum	.308	.308
Pig	.22 Magnum	.357 Magnum 12 Gauge SG	≥.243	≥.243
Kangaroo	.22LR	.22 Magnum 12 Gauge SSG	≥.222	≥.222
Goat	.22 Magnum	.22 magnum 12 Gauge SSG	≥.222	≥.243
Dingo/Dog	.22LR	.22 Magnum 12 Gauge AAA	≥.222	≥.243
Cat	.22LR	.22LR Magnum 12 Gauge BB	.22 Magnum	≥.222
Fox	.22LR	.22 Magnum 12 Gauge BB	≥.222	≥.222
Rabbit	.22LR	.22LR 12 Gauge #4 shot	.22 Magnum	.222
Small birds e.g. Silvereyes, Sparrows	Cervical dislocation or blunt trauma	.177 air rifle 410 Gauge #9 shot	☒	☒
Medium birds e.g. Parrots, starlings	Cervical dislocation or blunt trauma	.177 air rifle 12 Gauge #9 shot	≥.22LR	☒

Large birds e.g. Cockatoos, ducks	Cervical dislocation or blunt trauma	.22LR 12 Gauge #4 Shot	≥.22LR	☒
Extra-large birds e.g. Emus	.22LR	.22 Magnum 12 Gauge AAA	≥.222	≥.243
Crocodile 1.5-3.0m long > 3.0m long	.22 Magnum .357 Magnum	☒	☒	☒
Sea turtle	.22 Magnum	☒	☒	☒
Dugong	.357 Magnum	.308	☒	☒
Sea lion	.357 Magnum	.243	.243	☒

Appendix II Shooting techniques for common species

Kangaroos

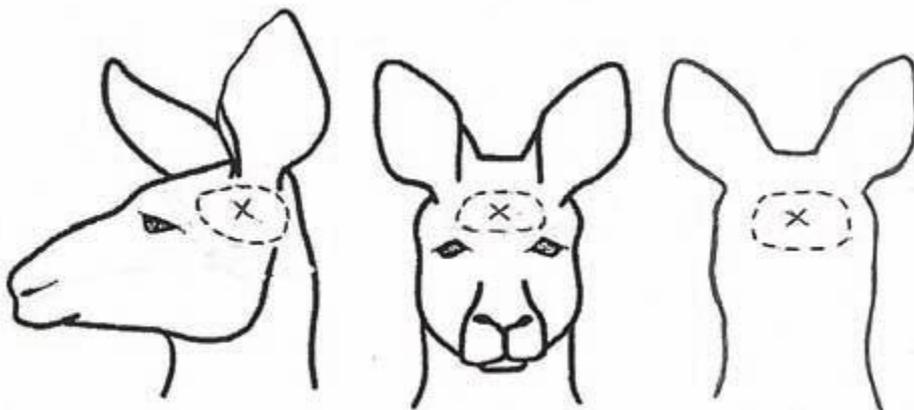
The following information is taken from DEH (1998) and NRMCC (2008).

There are large differences in the terrain and prevailing weather conditions that may exist at the time of shooting and common sense is required to assess these circumstances. Where the conditions are such as to raise doubt about achieving a sudden and humane death, shooting must not be attempted. Where an individual kangaroo or wallaby is injured, no further animals should be shot until all reasonable efforts have been made to locate and kill the injured animal.

Brain shot

Front view: Aim horizontally at the point of intersection of lines taken from the base of each ear to the opposite eye. This method is acceptable for younger animals, but not older animals (especially those that engage in head butting confrontations) because the frontal bones are very dense in older animals and the shot may not penetrate the skull.

Side View: Aim horizontally from the side of the head at a point midway between the eye and the base of the ear. This approach is preferred for mature or old animals that have developed dense frontal bone structures.



Note: A shot to the side of the head is preferred because it offers a larger target area.

Heart shot

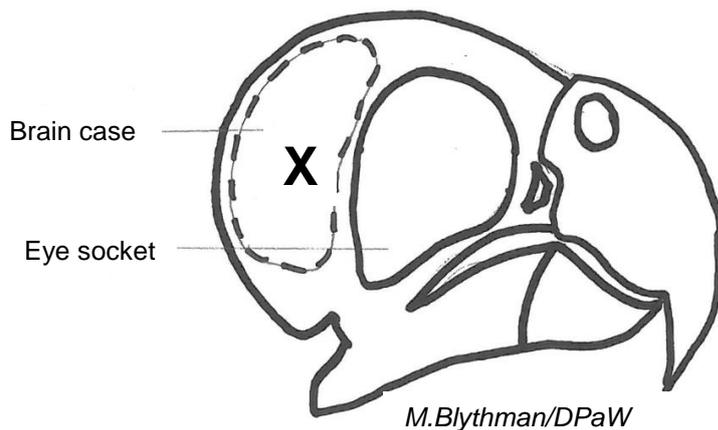
Front View: Aim horizontally at the mid-point of the chest midway between the forelegs and immediately below the base of the throat. Frontal chest shots should only be used for animals in the 'head high' position.

Side View: Aim horizontally at the centre of a line encircling the minimum girth of the animal, immediately behind the forelegs. The ideal side-on heart shot is taken from an angle slightly to the rear of the target animal's shoulder. This angle of aim is taken because the shoulder blade (scapula) provides partial protection of the heart from a direct side on shot.



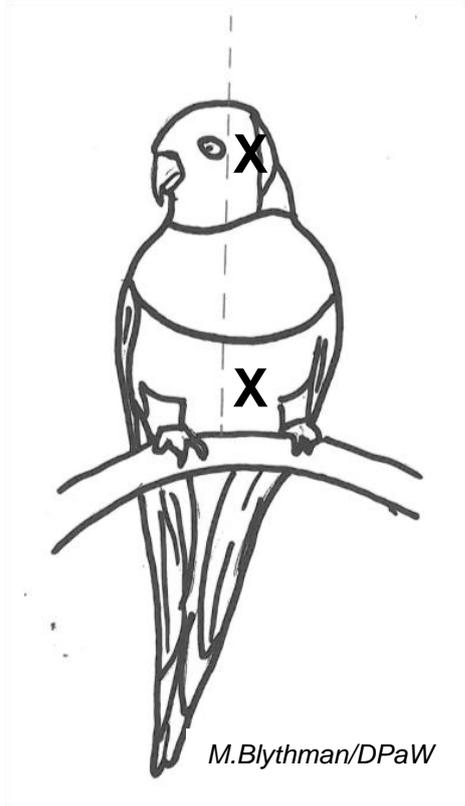
Birds

Never attempt to shoot moving birds. Wait until birds settle and are not obstructed by vegetation before a shot is attempted. A shot should only be taken where the operator is confident that a kill shot outcome is highly likely. A bird should be shot from front on wherever possible. A shot that misses the brain case or heart, and penetrates the gut or wing, may render a bird injured and capable of escape.



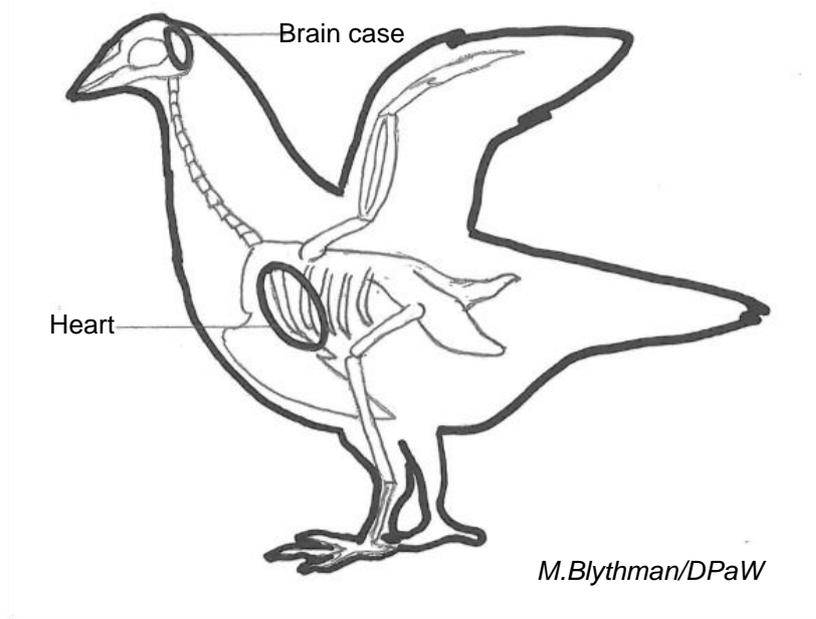
Brain shot

In most birds, the majority of the skull is comprised of empty space where the eyes sit. Aim for the area just behind the eyes, remembering that ruffled and/or some display feathers may make the skull appear bigger than it actually is.



Heart shot

A shot to the heart should be front on wherever possible. If taking a heart shot from side on, the projectile will need to travel through the wing before it gets to the heart. Projectiles may lodge in the wing or ricochet off a wing bone and miss the heart.



Crocodiles

For information regarding best practice shooting techniques for crocodiles see NRMMC (2009).

Marine fauna

For information regarding best practice shooting techniques for marine fauna including turtles, dugong, seals, sea lions, dolphins and whales < 6m long see DERM (2007). See Coughran *et al.* (2012) for information regarding euthanasia of large cetaceans.

Refer to Section 11 Further Reading/Sources for further publications advising recommended techniques and specifications for shooting various animals.