DEPARTMENT OF PLANNING, INDUSTRY & ENVIRONMENT

Code of Practice

for injured, sick and orphaned macropods

environment.nsw.gov.au

Cover photo: Yellow-footed rock-wallaby (*Petrogale xanthopus*). Shona Lorigan/DPIE

Acknowledgments

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Preface

The *Code of Practice for Injured, Sick and Orphaned Macropods* (the code) is intended for those authorised to rescue, rehabilitate and release macropods. The code has been developed to ensure the welfare needs of these mammals are met and the conservation benefits stemming from their rehabilitation and release are optimised. It also aims to ensure that risks to the health and safety of volunteers rescuing and caring for these animals are reduced and easily managed.

Compliance with the code does not remove the need to abide by the requirements of the:

- *Prevention of Cruelty to Animals Act 1979*
- *Poisons and Therapeutic Goods Act 1966*
- *Veterinary Practice Act 2003*
- *Animal Research Act 1985*
- *Local Government Act 1993*
- *Firearms Act 1996*

or any other relevant laws and regulations.

Compliance with the standards in the code is a condition of a biodiversity conservation licence (BCL) to rehabilitate and release sick, injured and orphaned protected animals issued under the NSW *Biodiversity Conservation Act 2016* (BC Act). A person who contravenes a condition of a BCL is guilty of an offence under section 2.14 (4) of this Act.

The code is neither a complete manual on animal husbandry nor a static document. It must be implemented by a person trained in accordance with the Macropod Rehabilitation Training Standards for the Volunteer Wildlife Rehabilitation Sector. It will be periodically reviewed to incorporate new knowledge of animal physiology and behaviour, technological advances, developments in animal welfare standards, and changing community attitudes and expectations about the humane treatment of macropods. The Department of Planning, Industry and Environment (the department) will consult with licence holders regarding potential changes to the code and give written notice when the code is superseded.

1. Introduction

This code sets standards for the care and housing of a macropod that is incapable of fending for itself in its natural habitat. It refers to 21 species of herbivore marsupial mammals comprising kangaroos, wallabies, wallaroos, pademelons, and bettongs found in New South Wales. (See Appendix 1.)

Twelve species are listed under the BC Act. Four species and one population of long-nosed potoroos at Cobaki Lakes and Tweed Heads West are listed as endangered. A further three species are listed as vulnerable, and the long-footed potoroo is listed as critically endangered.

Four species of macropods are listed as vulnerable or endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and there is a national recovery plan for the long-footed potoroo and brush-tailed rock-wallaby to improve their conservation status.

This code comprises both enforceable provisions and guidelines. Enforceable provisions are identified by the word ‘Standards’, and they must be followed.

1.1 Principles

The development of the code has been guided by four key principles which apply to all aspects of macropod rescue, rehabilitation and release:

Prioritise the welfare of macropods

The main objective of wildlife rehabilitation is to relieve suffering in sick or injured wildlife. The rehabilitation and release of macropods to the wild is the primary objective. It must not be pursued to preserve life of the animal at all costs or achieve broader conservation outcomes where the animal is subject to unreasonable and unjustifiable suffering.

Avoid harm to wild macropod populations and other wildlife communities

In wildlife rehabilitation there is a risk of adverse ecological outcomes. The inappropriate release of animals can have significant detrimental effects on the local ecosystem and wildlife communities. At all stages of wildlife rehabilitation, the potential adverse ecological outcomes must be considered and conservation benefits for wild macropod populations maximised.

Minimise the risks to human health and safety

There are many risks in all aspects of rehabilitation, including personal injury and disease, requiring consideration to ensure preventative measures are in place. All personnel involved in rescue, rehabilitation and release of macropods must understand practical health and safety measures such as undertaking a risk assessment, using personal protective equipment, and even delaying action to ensure safety measures are in place to protect their health and safety.

Optimise capacity to care

Wildlife rehabilitators must ensure they can provide for the essential needs of macropods undergoing rehabilitation, and the resources to adequately prepare the macropod for release

back into the wild. When the wildlife rehabilitator's capacity to care is exceeded, unacceptable standards of care or welfare may result. Wildlife rehabilitators must be mindful of their capacity to care, particularly when there is an influx of wildlife requiring care due to major incidents, significant weather events or disease outbreak.

When the capacity to care is exceeded there are three acceptable management options:

- refer the macropod to another licensed wildlife rehabilitator with a current capacity to care for the mammal
- increase the capacity to care by increasing or pooling resources
- lower the euthanasia threshold in combination with early-stage triage of newly rescued animals and proper veterinary assessment and prognosis of macropods in care.

Lowering the standards of care, such that they are not consistent with this code, is not an acceptable response to exceeding the capacity to care. In circumstances that involve major catastrophic events and where capacity to care is exceeded, lowering the threshold for euthanasia is a more appropriate response than not rescuing animals in distress.

1.2 Interpretations

Objectives

'Objectives' are the intended outcomes for each section of this code.

Standards

'Standards' describe the mandatory specific actions needed to achieve acceptable animal welfare levels. These are the minimum standards that must be met. They are identified in the text by the heading 'Standards' and use the word 'must'.

Guidelines

'Guidelines' describe the agreed best practice following consideration of scientific information and accumulated experience. They also reflect society's values and expectations regarding the care of animals. A guideline is usually a higher standard of care than minimum standards, except where the standard is best practice.

Guidelines will be particularly appropriate where it is desirable to promote or encourage better care for animals than is provided by the minimum standards. Guidelines are also appropriate where it is difficult to determine an assessable standard. Guidelines are identified in the text by the heading 'Guidelines' and use the word 'should'.

Notes

Where appropriate, notes describe practical procedures to achieve the minimum standards and guidelines. They may also refer to relevant legislation.

1.3 Definitions

In this code:

Barrier nursing means husbandry practices used to provide complete isolation of a patient to minimise the risk of cross-contamination between patients and from patients to the wildlife rehabilitator responsible for their care. It includes the physical separation of patients, avoiding sharing tools and furniture equipment between animals, wearing personal protective equipment (e.g. masks, eye protection, gloves, gowns, aprons, overshoes), and using infection control procedures (e.g. equipment sterilisation and regular use of disinfectant).

Husbandry plan means developing a plan for the rehabilitation and care of a macropod that includes monitoring, feeding, treatment and toileting.

Immediate risk of injury means the likelihood of an animal becoming injured and requiring care is high if immediate intervention is not undertaken, based on a reasonable situation assessment.

Experienced macropod rehabilitator means someone who has extensive knowledge of current rehabilitation techniques gained through training courses and many years of successfully rehabilitating and releasing macropods.

Macropods are animals classified as members of the superfamily Macropodoidea. These are a group of herbivore marsupial mammals comprising kangaroos, wallabies, wallaroos, pademelons and bettongs. All have long, flat, soft feet and weakly developed forelimbs. A list of NSW macropods is provided in Appendix 1.

Park means a national park, historic site, state conservation area, regional park, nature reserve, karst conservation reserve or Aboriginal area, or any land acquired by the Minister under the NSW *National Parks and Wildlife Act 1974*.

Protected animal means any amphibian, reptile, bird or mammal (except dingos) listed or referred to in Schedule 5 of the BC Act that is native to Australia or that periodically or occasionally migrates to Australia (including their eggs and young).

Recovery, when referring to an individual, means a return to a functional condition after an injury or illness. This includes the natural ability of an animal to feed, interact, move, and evade risks and hazards in a wild situation.

Species coordinator is an experienced wildlife rehabilitator nominated by a group to liaise and advise volunteers on the rehabilitation of particular species, e.g. possums and gliders, koalas, macropods. Species coordinators should be skilled in applying the code and have a role in monitoring volunteers, distributing rescued animals to volunteers, and liaising with the local veterinary hospital.

Wildlife rehabilitator means someone who is either authorised by a wildlife rehabilitation provider or zoological park or is individually licensed by the department to rehabilitate and release protected animals.

Wildlife rehabilitation means the temporary care of an injured, sick or orphaned protected animal with the aim of successfully releasing it back into its natural habitat.

Wildlife rehabilitation provider means an incorporated wildlife rehabilitation group, individually licensed wildlife rehabilitator, or a facility licensed by the department under the BC Act to rehabilitate and release protected animals.

Zoonoses are diseases that can be transmitted from animals to humans.

1.4 Stages of development in macropods

Pouch young:

- pinkies are unfurred joeys
- velvet are lightly furred joeys
- pouched fur are joeys with a substantial layer of fur
- emerging joeys are fully furred and start to leave the pouch, going in and out of the pouch regularly.

Young at foot are fully emerged joeys.

Subadult are weaned macropods.

Adult are sexually mature macropods.

Geriatric are aged macropods with rear molars only.

2. Case assessment

2.1 Assessing macropods

Objective

To assess a macropod to determine the type of intervention required. The primary objective of rehabilitation is the successful reintegration of the macropod back into the wild population, and all decisions are in pursuit of this goal. This will mean some macropods may benefit from rehabilitation, whereas others will need to be euthanased.

Standards

2.1.1 The decision tree in Figure 1 must be followed when determining how to respond to a macropod encounter.

2.1.2 Rescuers must arrange for the macropod to be assessed by a veterinarian or experienced macropod rehabilitator within 24 hours of rescue to ensure accurate diagnosis and prompt treatment or euthanasia. If this is not possible due to the remoteness of the location, expert advice must be sought, e.g. via telephone.

Note

An animal creating a nuisance for the public generally refers to an animal that has entered a person's house or represents a human health risk, e.g. large kangaroos in residential areas. It does not include an animal defending its territory (e.g. a magpie) or exhibiting other normal behaviour (e.g. a brush turkey building a mound). The department has a range of policies guiding the response to aggressive wildlife.

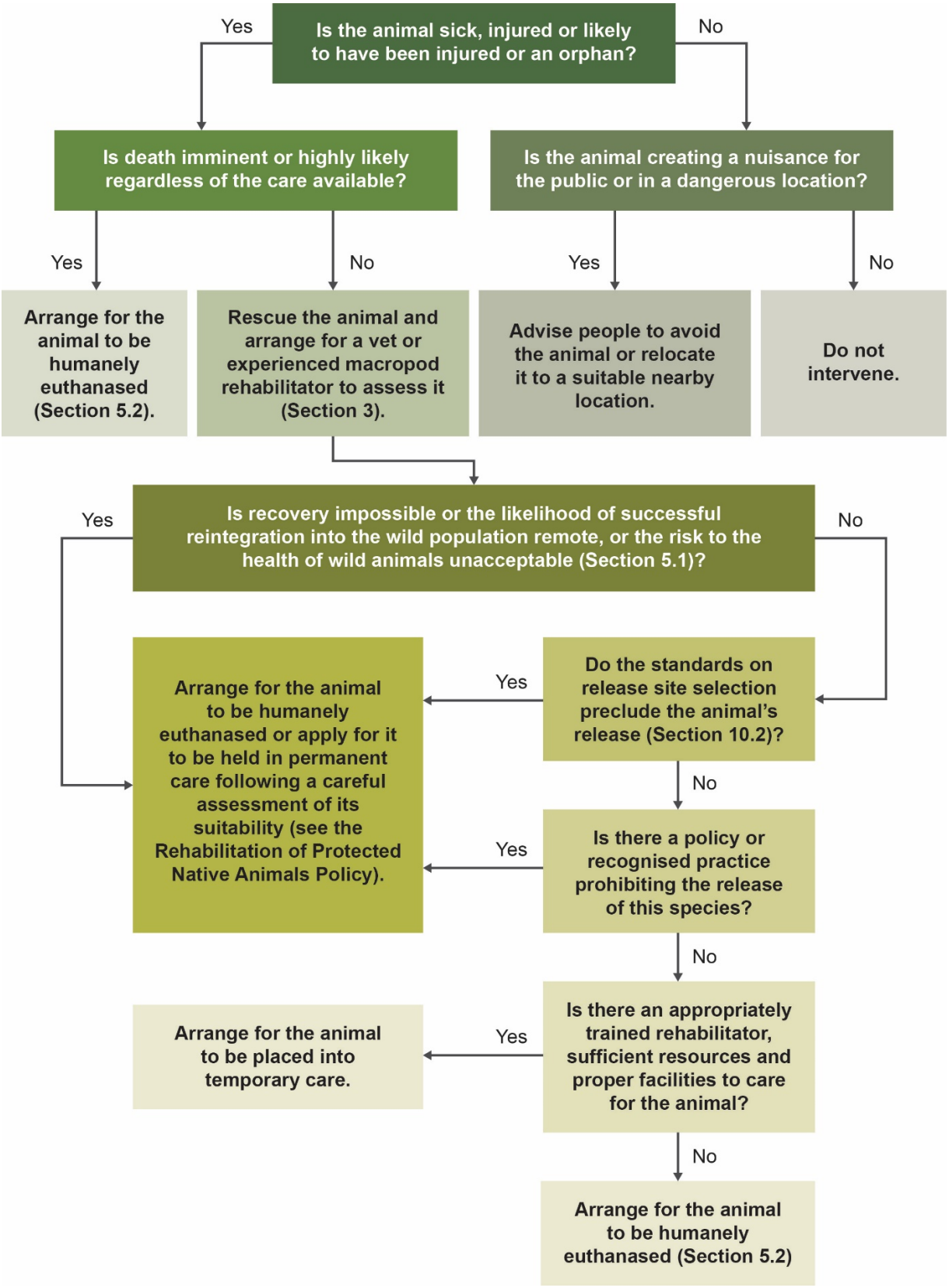

Figure 1 **Decision tree for course of action when a macropod is encountered**

3. Rescue

3.1 Rescuing macropods

Objective

To conduct a macropod rescue to minimise further stress and injury to the animal.

Standards

3.1.1 Before a rescue attempt, the rescuer must assess the risks to the macropod from environmental hazards and from capture.

3.1.2 Before a rescue attempt, the rescuer must assess the risks to themselves and members of the public.

3.1.3 Rescuers must employ the correct rescue equipment for the location, size, condition and species of macropod and be trained in its use (see Section 11: Training).

3.1.4 The following methods must not be used to capture a macropod:

- noosing with a rope
- prolonged pursuit
- legs must not be tied
- hessian or plastic bags must not be used.

3.1.5 If attending a deceased female macropod:

- look for a joey in the pouch
- remove and contain a furred joey before it hops away
- unfurred (pinkies) and lightly furred joeys may be attached to the teat and must be removed by applying gentle pressure to the sides of the joey's mouth to relinquish the teat, or by cutting the teat close to the mother's body – this is to prevent damage to the joey's palate
- all joeys must be removed by gently scooping with one hand under the joey's back
- avoid pulling on the tail or the limbs
- do not cut the pouch or teat of a live macropod.

3.1.6 If the macropod is an injured female with signs of having a pouch young (e.g. elongated teat, stretched pouch), the surrounding area must be searched for the young and monitored regularly (e.g. daily for at least several days) if the joey is not immediately found.

3.1.7 Always approach a recumbent macropod from behind.

3.1.8 Rescuers must only attempt to rescue a macropod when a sufficient number of trained personnel for that species and size are involved.

3.1.9 Other than a mother and her pouch young, each macropod rescued must be contained in an individual rescue bag.

3.1.10 If multiple macropods are rescued (e.g. on a fire ground), the containers they are placed in must be labelled with the capture location, date and rescuer's name.

3.1.11 Rescuers must use suitable work, health and safety techniques to minimise the risk of injury to the rescuer (e.g. wearing personal protective equipment such as gloves and long sleeves).

Guidelines

3.1.12 When the mother has died, a healthy young at foot macropod joey should be monitored and assessed by an experienced macropod rehabilitator to see if it will be at risk from predators and is able to remain with the mob, or needs to be taken into care.

3.1.13 The rescue of an adult macropod should not be attempted unless at least two trained personnel are involved.

3.1.14 When the injured macropod is a live female, the method of rescue should consider the reproductive status of the animal as follows:

- injured females with a joey in the pouch should be assessed and rescued with the joey retained in the pouch
- injured females with young at foot should be assessed and the joey captured and secured at the outset wherever possible.

3.1.15 Capture should be swift and effective with the goal of promptly containing the animal by a means that limits exposure to additional stressors such as onlookers, loud noises, other animals, and extremes of temperature.

3.1.16 Macropods exposed to acute or prolonged stress (e.g. chased, fence wire entanglement, etc.) should, where possible, be brought into care for monitoring, as injuries may not be immediately apparent.

Notes

- If the joey is removed while still attached to the teat, a safety pin should be placed through the teat to ensure the joey does not swallow it.
- Macropods are nervous, easily stressed animals with a highly developed flight response to perceived threat.
- Covering a macropod's head at the first opportunity will reduce stress.
- Dehydrated macropods may need rehydration before transport.
- Stressed macropods should be carefully monitored for signs of capture myopathy and expert advice sought about the need for treatment and management.

4. Transport

4.1 Moving macropods

Objective

To minimise further stress and injury to a macropod during transport. This section applies to all movements of the macropod including from the point of rescue, to a veterinary surgery, between rehabilitation facilities, and to the release site.

Standards

4.1.1 Transport methods and container sizes must be appropriate for the species, size, strength and temperament of the macropod. For example:

- an uninjured orphaned pouch young requires a liner and outer artificial pouch, made from natural fibres, that is suspended securely within the transport vehicle
- artificial heat sources (e.g. a hot water bottle or heat pad) for unfurred pouch young are likely to be required – the heat source must be placed on the outside of the pouch to prevent the animal from coming into direct contact with it.

4.1.2 Transport bags and containers must be designed, set up and secured to prevent injuries to the macropod. For example:

- covering floors with a non-slip, non-ingestible, tangle-free surface
- padding walls when needed
- if using an artificial pouch or transport bag for pouch young or small macropods, it must be placed inside a larger solid transport container to prevent injuries from the seatbelt
- hessian sacks must not be used as the threads can irritate the eye or be inhaled.

4.1.3 Containers must be designed to prevent the macropod from escaping.

4.1.4 Macropods with suspected pelvic or spinal injuries must be transported lying flat and contained to reduce pain and prevent further injury. Transport must include sufficient cushioning to help stop rough vibrations and jerking.

4.1.5 A macropod in a transport bag or container must be positioned so its breathing is not restricted, and its pain or discomfort is minimised.

4.1.6 Transport bags and containers must be ventilated so air can circulate around the macropod.

4.1.7 Transport bags and containers must be kept at a temperature appropriate for the macropod's stage of development. For example:

- 32°C is appropriate for unfurred joeys (pinkies)
- 30°C is appropriate for lightly furred joeys (velvet)
- 28°C is appropriate for fully furred joeys.

4.1.8 The temperature and condition of the macropod must be regularly monitored during transport.

4.1.9 Containers must minimise light, noise (e.g. radio), and vibrations and prevent exposure to young children, pets and cigarette smoke.

4.1.10 A macropod must not be transported in the back of an uncovered utility vehicle, a car boot that is separate from the main cabin, on the rescuer's lap, or on the body and under the clothing of a rescuer.

Guidelines

4.1.11 The use of medication to facilitate transport (sedation or analgesia) should be assessed and approved by a veterinarian.

4.1.12 Joeys should be transported to their final wildlife rehabilitator before emergence from the pouch.

4.1.13 Macropod transport should be the sole purpose of the trip and undertaken in the shortest possible time.

4.1.14 Transport of an adult macropod from the rescue site should be undertaken only if there is no other option and an experienced macropod rehabilitator has assessed the animal.

5. Euthanasia

5.1 When to euthanase

Objective

To end a macropod's life in situations where death is imminent, full recovery is impossible, the likelihood of successful reintegration into the wild population is remote, or the macropod poses an unacceptable disease risk to other animals in the wild once released.

Standards

5.1.1 A macropod must be euthanased without exception when:

- death is imminent or highly likely regardless of the treatment provided
- it is suffering from chronic, unrelievable pain or distress
- it is carrying an incurable disease that may pose a health risk to other wild animals
- its ability to consume food unaided is permanently impaired due to an injured jaw or missing or worn teeth
- it has significant burns to the face, genitals, digits, nail beds, tail or feet.

5.1.2 A macropod must be euthanased (unless the department has granted permission to hold it in permanent care) when:

- there is no suitable release location
- its ability to locomote, e.g. jump or hop and its ability to escape predators, is permanently impaired due to a missing or injured hind limb, back bone or tail
- its ability to sense its environment (i.e. see, hear, smell, taste or feel) is permanently impaired due to a missing or injured organ (e.g. eye, ear or nose)
- its ability to forage successfully is permanently impaired
- its advanced age renders it unable to survive in its natural habitat.

In certain exceptional circumstances, the department may grant permission to hold such animals in permanent care or arrange placement with an authorised animal exhibitor licensed by the NSW Department of Primary Industries (DPI). See the Rehabilitation of Protected Native Animals Policy for details.

5.1.3 The department must be notified when a macropod listed as a threatened species (Appendix 1) has lost its ability to reproduce due to an injury, disease or procedure. This is to ensure the population is not compromised due to habitat competition if the macropod was to be released.

Guidelines

5.1.4 A macropod should be euthanased if it is at a stage of development where it is unlikely to be successfully hand-reared to the point where it can be released.

5.1.5 The decision to euthanase should not be based on a macropod's weight at rescue.

5.1.6 The decision to euthanase should not be based on availability of carers within the rescue group. The group should liaise with other licensed groups to facilitate care if necessary.

5.2 How to euthanase

Objective

To induce death with minimal pain and distress to the macropod.

Standards

5.2.1 A euthanasia method must be used which produces a rapid loss of consciousness immediately followed by death.

5.2.2 Death must be confirmed immediately following the euthanasia procedure and before disposal of the carcass. The absence of a heartbeat and the loss of corneal reflexes indicate death has occurred.

5.2.3 Acceptable methods for euthanasia of macropods include:

- anaesthesia followed by an intravenous (preferred) or intracardiac injection of sodium pentobarbital – this must be performed by a veterinarian
- shooting with an appropriate firearm by head or heart shot
- blunt force trauma to the base of the skull with a single blow
- stunning immediately followed by decapitation (for smaller animals)
- stunning followed by cervical dislocation.

5.2.4 The following euthanasia methods must not be used on macropods:

- suffocation via drowning, strangulation or chest compression
- freezing or burning
- carbon dioxide in any form
- poisoning with household products
- air embolism
- exsanguination or decapitation without prior stunning
- electrocution or microwave irradiation
- chloroform or strychnine
- neuromuscular blocking agents.

Guidelines

5.2.5 Macropod rehabilitators should arrange for a veterinarian to perform euthanasia. Intravenous barbiturate overdose should be used, with sedation before euthanasia.

5.2.6 Shooting should be undertaken by a licensed, skilled and experienced wildlife rehabilitator or an appropriate agency, such as NSW National Parks and Wildlife Service (NPWS), the Royal Society for the Prevention of Cruelty to Animals (RSPCA) or NSW Police.

5.2.7 A macropod that requires euthanasia should not be exposed to additional stressors such as large numbers of onlookers, people touching it, loud noises, or extremes of temperature.

Notes

For further information on appropriate euthanasia methods refer to:

- Australian Code for the Care and Use of Animals for Scientific Purposes (8th edition, NHMRC 2013).
- The National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-Commercial Purposes (Commonwealth of Australia 2008). It contains conditions for euthanasing injured kangaroos and wallabies.
- The *Firearms Act 1996* specifies animal welfare as a genuine reason for having a firearms licence.
- The *Veterinary Practice Act 2003* places restrictions on the types of procedures non-veterinarians can perform on animals.
- The *Poisons and Therapeutic Goods Act 1966* places restrictions on the types of poisons people can possess.

5.3 Disposal of carcasses and animal waste

Objective

To dispose of waste so the risks of disease transmission are minimised.

Standards

5.3.1 Carcasses and organic waste must either be incinerated (under licence), taken to a licensed waste facility or, if on private land, buried at a depth that will prevent scavengers from reaching them.

5.3.2 Macropods that have died from disease or chemical means (e.g. barbiturate overdose) must not be fed to other animals.

Guidelines

5.3.2 If the cause of death is uncertain, a deceased macropod should, whenever possible, undergo a necropsy by a veterinarian.

5.3.3 Wildlife rehabilitators should make every effort to reduce the risk of contracting zoonoses such as salmonella, Q fever, thrush, and fungal infections by:

- implementing barrier nursing techniques (e.g. wearing personal protective equipment such as a mask, gloves and gown)
- ensuring they are vaccinated for tetanus and Q fever.

5.3.4 The Australian Museum should be contacted for all dead listed species in Schedule 1 of the BC Act (See Appendix 1), as these carcasses are of scientific significance.

Note

Further information on carcass disposal can be found in the Department of Primary Industries fact sheet: Animal carcass disposal, including particular information on the proper construction and location for a burial site to protect the water table.

6. Care procedures

6.1 Assessment

Objective

To identify the severity of wounds, injuries or disease to determine the best course of action for a macropod undergoing rehabilitation.

Standards

6.1.1 A macropod must, in the first instance, be assessed by the closest or most appropriately trained macropod rehabilitator.

6.1.2 The species of macropod must be identified.

6.1.3 A macropod must be weighed and measured on admission.

6.1.4 On admission, a macropod must be checked for:

- bleeding, wounds or swelling
- bone fractures (use weight-bearing assessment and gait assessment)
- weakness or paralysis
- rapid breathing or elevated heart rate
- erratic eye movement or sunken eyes
- hydration status
- pale or cold gums
- temperature
- external parasites, e.g. ticks, lice or flat flies
- discharge from the eyes, nostrils, mouth or cloaca
- skin conditions or hair loss
- odd smells
- jaw alignment or broken teeth
- diarrhoea.

6.1.5 Once identified, disease and injury problems need to be prioritised for management according to severity (triage). This may require veterinary input. Health management of macropods in care must always strive for optimal animal welfare. Recognition and management of pain is important.

6.2 Monitoring

Objective

To determine the health status of macropods undergoing rehabilitation so concerns can be promptly identified and managed. The type and frequency of monitoring will vary with the species, age or stage of development, type of injury or illness, and required treatment.

Standards

6.2.1 Macropods are sensitive animals and easily stressed by aspects of being in human care. Acute stress can result in flight response and injury or myopathy, and chronic stress can result in increased susceptibility to disease. Macropod carers must be vigilant for signs of acute and chronic stress.

6.2.2 Monitoring a macropod must include:

- visually assessing body condition and demeanour
- checking for signs of injury, disease and parasites
- assessing hydration by looking at the eyes (sunken eyes can suggest dehydration) and noting the quantity and quality of faeces and urine
- looking for indications of activity
- assessing the trend in weight, e.g. gain or loss.

6.2.3 All pouch young must be monitored at each feed.

6.2.4 All pouch joeys must be weighed daily until they show a stable weight gain, and then they should be weighed as follows:

- unfurred joeys (pinkies) and lightly furred joeys (velvets) must be weighed every two days
- pouch furred, emerging and fully emerged joeys must be weighed weekly
- subadults (weaned joeys) must be monitored daily and weighed when required, if they can be caught without causing stress, as weaned animals have begun the dehumanising phase of their rehabilitation.

6.2.5 Wildlife rehabilitators must regularly monitor the temperature of any artificial heat source (e.g. blankets, hot water bottles, incubators and electric heat mats) within artificial pouches and enclosures containing thermal support, to ensure appropriate temperatures are maintained.

6.2.6 Antibiotics must be given by or under the guidance of a veterinarian and with extreme caution due to the spread of antibiotic resistance and harm to wild populations.

6.3 Controlling disease transmission between animals

Objective

To prevent the spread of diseases among macropods undergoing rehabilitation. Stressed animals are more susceptible to contracting and expressing infectious diseases.

Standards

6.3.1 A newly arrived macropod must be isolated in a separate area until a veterinarian or experienced macropod rehabilitator can determine its disease status.

6.3.2 A macropod suspected or known to be carrying an infectious disease must be kept under strict quarantine conditions throughout its illness, and wildlife rehabilitators must wear personal protective equipment (e.g. gown, mask and gloves) to prevent contracting zoonoses.

- signs of disease may include coughing, sneezing, abnormal respiration, discharge from the eyes or nose and diarrhoea.

6.3.3 Dedicated cleaning equipment must be used for enclosures housing macropods with a suspected or confirmed infectious disease.

6.3.4 All enclosures, transport containers, enclosure furniture, food and water containers must be thoroughly cleaned and disinfected after each occupant.

6.3.5 Macropods undergoing rehabilitation must be prevented from coming into contact with domestic pets.

6.3.6 Wildlife rehabilitators must wash their hands thoroughly with soap or disinfectant before and after handling each animal in care.

6.3.7 If a macropod is suspected to be carrying a notifiable disease (e.g. Q fever), or an unusual disease or a mortality event is suspected, the wildlife rehabilitator must immediately contact their species coordinator to notify the DPI Emergency Animal Disease Hotline (24 hours) on 1800 675 888 for immediate assessment of emerging health threats.

Guidelines

6.3.8 When handling multiple animals, wildlife rehabilitators should start with the healthiest and finish with the sickest, to reduce the risks of disease transmission.

6.3.9 Different species undergoing rehabilitation should be kept in separate enclosures at all times.

6.3.10 Should it be necessary to house different species together, care should be taken to minimise aggressive interactions.

6.3.11 Wildlife rehabilitators should make every effort to reduce the risk of contracting zoonoses such as salmonella, thrush, and fungal infections, including ringworm by:

- implementing barrier nursing techniques (e.g. wearing personal protective equipment such as a mask, gloves and gown)
- having vaccinations for tetanus and Q fever.

6.3.12 Pest control is recommended for all rehabilitation facilities.

Note

If unwell, wildlife rehabilitators should remind their medical practitioner they are caring for a sick animal, and there is a possibility of having contracted a disease.

7. Husbandry

7.1 Food and water

Objective

To ensure a macropod has a feeding and watering regime that encourages rapid recovery, supports growth in juveniles, and assists with maintaining foraging behaviour necessary for survival in the wild.

Standards

7.1.1 Clean, fresh drinking water must be available at all times, and water in containers must be changed daily.

7.1.2 Water containers must be designed and positioned to avoid spillage, contamination, and temperature extremes and must be appropriate for a macropod's species, size, age of development, and mobility.

7.1.3 If bathing water is required, it must be in a separate area from drinking water.

7.1.4 Macropods must be provided with a balanced and complete diet that supports growth and development and is appropriate for the species, size, age, stage of development, mobility and physiological status of the animal.

7.1.5 Food that is available in the wild must form the basis of the macropod's diet.

7.1.6 Hand-reared macropods must be fed a lactose-free milk formula appropriate for the species and stage of development.

7.1.7 Maintenance fluid requirements vary depending on many factors. Careful attention must be paid to the total fluid intake to avoid dehydration. The amount required will depend on the stage of development, environmental conditions and the presence of illness or injury.

7.1.8 Extra hydration, when required by orphaned dependent pouch young, must be offered separately from the formula feeds and not by diluting the milk feed formula. The hydration needs will vary depending on formula type, feeding frequency, health status and stage of development.

7.1.9 Hand-reared macropods must be fed milk formula from a bottle and teat until they are weaned. In some situations, bettongs can be fed milk formula by lapping rather than a bottle and teat.

7.1.10 Unfurred joeys (pinkies) must be fed over 24 hours with an evenly spaced feeding schedule.

Guidelines

7.1.11 Food in storage should not be accessible to pets, pests and wild animals and should be protected from contamination and nutritional loss.

7.1.12 Nutritional and fluid support is vital for adult macropods in the intensive and intermediate care stages if their appetite is depressed or they are dehydrated. A variety of blended products and commercial formulae suitable for herbivores can be used for this purpose.

7.1.13 Contaminant-free dirt, leaf-litter, grass, hay (but not chaff) and native grasses and shrubs should be offered to all macropods from the furred pouch joey stage of development.

7.1.14 Contaminant-free dirt, leaf-litter, grass, hay (but not chaff, oats or lucerne) and native grasses and shrubs should be offered to all macropods in intermediate and pre-release stages and should comprise the bulk of the diet.

7.1.15 Supplementary feed (e.g. pellets) should be offered to macropods in rehabilitation. Products that mimic the nutrient composition of the wild diet as closely as possible are preferred (i.e. forage-based, high-fibre pellets manufactured for native herbivores such as kangaroos with low to moderate protein (less than 14%) and low vitamin D levels).

7.1.16 Foods such as dog biscuits and other high-energy foods should be avoided as they do not mimic the wild diet, contain excess sodium, and as such do not promote normal dental wear and the development of normal gastrointestinal and nutritional health.

7.1.17 Carrots should not be fed to macropods.

7.1.18 Food and water guidelines for dependent macropods:

- unfurred joeys (pinkies) should be fed milk six to eight times a day
- lightly furred joeys (velvet) should be fed milk four to six times a day
- pouched fur joeys should be fed milk three to four times a day
- emerging joeys should be fed milk three to four times a day
- fully emerged joeys should be fed milk two times a day
- as a joey approaches weaning, the milk feed should be dropped to once a day then ceased – supplementary food is needed, and water should be topped up daily.

Notes

- Joeys of the same age and stage of development can vary significantly in the quantities of formula ingested at each feed.
- Gently stimulating the cloaca of joeys that have not emerged from the pouch, before or after each feed, will encourage voiding of faeces and urination.

7.2 Hygiene

Objective

To maintain clean rehabilitation facilities so that diseases are prevented or contained.

Standards

7.2.1 Faeces and uneaten food must be removed daily and disposed of to ensure other animals cannot consume them (e.g. in closed garbage or compost bins).

7.2.2 Food and water containers must be cleaned daily. Cleaning involves the use of water, a detergent and the physical removal of all residues.

7.2.3 Bottles, teats and syringes used for feeding pinkies must be sterilised before every feed.

7.2.4 Water used to mix milk formula for (pinkies and velvet) joeys must be cool pre-boiled water. At sea level, water needs to be boiled for one minute to sterilise it.

7.2.5 Enclosure furniture, bedding, weighing bags and pouches must be cleaned when soiled.

7.2.6 A macropod must be cleaned when soiled with faeces, urine or uneaten food.

7.2.7 Wildlife rehabilitators must minimise the disturbance to macropods when cleaning.

7.2.8 Wildlife rehabilitators must wash their hands and clean all food preparation surfaces and equipment before preparing macropod food.

Guidelines

7.2.9 Equipment used for cleaning animal enclosures, containers and furniture should be separate from those used domestically.

7.2.10 In affected areas, preventative treatment for coccidiosis and intestinal worms should also be considered while caring for macropods.

7.3 General care

Objective

To ensure macropods have a care regime that encourages rapid recovery, supports growth in juveniles, and assists with behaviours necessary for survival in the wild.

Guidelines

7.3.1 The buddying of macropods is recommended for the development of natural behaviours and to minimise stress. Wildlife rehabilitation providers should liaise with other providers to facilitate buddying where possible.

7.3.2 All husbandries should be covered in macropod-specific training (see Section 11: Training).

7.3.3 Each macropod should have a husbandry plan.

7.3.4 Macropods are very prone to imprinting and humanisation to people. All care should be taken, particularly after weaning, to minimise social interactions with humans, and natural behaviours should be allowed to develop.

8. Housing

8.1 General requirements

Objective

To ensure a macropod undergoing rehabilitation is housed in enclosures that keep it safe, secure and free from additional stress.

Standards

8.1.1 Enclosures must be escape-proof.

8.1.2 Housing must be made safe for macropods to live in by excluding hazards that might harm them.

8.1.3 Housing must be made safe for the rehabilitator by excluding hazards that may harm them (e.g. electrocution from electrical equipment near water).

8.1.4 Housing must be designed and positioned to protect the macropod from physical contact with wild animals and pests.

8.1.5 Housing must be designed so rehabilitators can readily access the macropod.

8.1.6 Housing must be positioned, so the macropod is not exposed to strong vibrations, noxious smells (e.g. wood smoke) or loud noises (e.g. radios, televisions or barking dogs).

8.1.7 Housing must be constructed from non-toxic materials that can be easily cleaned and disinfected.

8.1.8 If multiple macropods are kept within a single enclosure, there must be sufficient space for individuals to avoid undue conflict or harm from each other.

Guideline

8.1.9 Enclosures should be at least the size specified in each stage of rehabilitation for the species. These dimensions are suitable for average-sized adults. Smaller individuals may not require the space specified, and larger individuals may require more space.

8.1.10 Housing should be designed and positioned so macropods cannot see domestic pets.

8.2 Intensive care housing

Objective

To facilitate frequent monitoring, treatment, feeding and rehydration during the period immediately after coming into care until the animal is stabilised.

Standards

8.2.1 Intensive care housing must provide sufficient space for the macropod to maintain a normal posture and stretch its body and limbs, but not enough space to hop and jump.

8.2.2 Pouched young must be positioned in the artificial pouch in a way that mimics the natural position it would be in its mother's pouch; however, some injuries will require the pouched young to lie flat.

8.2.3 Intensive care housing must provide a constant temperature appropriate to the species, stage of development and nature of the illness or injury.

8.2.4 The temperature in intensive care housing must be regularly monitored using a thermometer, with minimal disturbance to the macropod.

8.2.5 A thermostat must regulate electrical heat sources.

8.2.6 Macropods (excluding unfurred joeys) in intensive care housing must experience a light–dark cycle that replicates outside conditions. If an artificial light source is used, it must be separate from any artificial heating.

8.2.7 Intensive care housing must be designed and positioned so visual and auditory stimuli are reduced (e.g. by covering with a towel and placing in a quiet room.

8.2.8 Intensive care housing must be adequately ventilated without allowing excessive draughts.

8.2.9 Substrate used in intensive care housing must be soft, non-slip material and replaced when soiled.

Guidelines

8.2.10 Intensive care housing for small macropods (e.g. bettongs) should be a minimum of 1 metre long, 1 metre wide and 1 metre high.

8.2.11 Intensive care housing for medium-sized macropods (e.g. swamp wallaby) should be a minimum of 1.5 metres long, 1.5 metres wide and 1.5 metres high.

8.2.12 Intensive care housing for large-sized macropods (e.g. grey kangaroos) should be a minimum of 2 metres long, 2 metres wide and 1.8 metres high.

8.2.13 Artificial pouches should mimic the mother's pouch and be snug and allow enough room for the joey to turn sideways, tumble and stretch.

8.2.14 Artificial pouches should be made from natural fibres and have no loose threads.

8.2.15 Intensive care housing should permit easy access for the wildlife rehabilitator to clean the facility and medicate and assess the animal.

8.3 Intermediate care housing

Objective

To provide a mobile macropod with enough space to allow some physical activity while enabling it to be readily caught for monitoring or treatment.

Standards

8.3.1 Intermediate care housing must provide sufficient space for the macropod to move freely while being conveniently sized for capture.

8.3.2 If an artificial heat source is provided, the macropod must be able to move to a cooler section of the enclosure. A thermostat must regulate electrical heat sources.

8.3.3 Macropods in intermediate care housing must experience a light–dark cycle that replicates outside conditions. This may be achieved by placing the enclosure in a well-lit room or in a sheltered area outside.

Guidelines

8.3.4 Intermediate care housing for small macropods (e.g. bettongs) should be a minimum of 2 metres long, 2 metres wide and 2 metres high.

8.3.5 Intermediate care housing for medium-sized macropods (e.g. swamp wallaby) should be a minimum of 3 metres long, 3 metres wide and have fencing 1.8 metres high.

8.3.6 Intermediate care housing for large-sized macropods (e.g. grey kangaroos) should be a minimum of 10 metres long, 3 metres wide and have fencing 1.8 metres high.

8.3.7 Intermediate care housing should have shade and shelter to allow the macropod to escape extremes of temperature.

8.3.8 Hand-reared macropods should be exposed to members of the same species or family during the intermediate care stage.

8.3.9 Small macropods (e.g. bettongs) should have predator-proof housing (e.g. from pythons and birds of prey) and may require wire-mesh roofing.

8.4 Pre-release housing

Objective

To allow the macropod to regain its physical condition, acclimatise to current weather conditions and practice natural behaviour. At this stage of rehabilitation, interactions between the macropod and humans will be greatly reduced.

Standards

8.4.1 Pre-release housing must provide sufficient space for the macropod to move about freely and express a range of natural behaviours.

8.4.2 Pre-release housing must provide areas where the macropod can gain exposure to prevailing weather conditions and areas where it can shelter.

8.4.3 Pre-release housing must contain habitat elements that enable the macropod to perform a range of natural behaviours. For example, kangaroos require:

- open areas
- locations for dust bathing
- native vegetation for hiding
- obstacles to jump over.

8.4.4 Pre-release housing must be designed and positioned so that exposure to humans is kept to the minimum required for monitoring, feeding and cleaning.

8.4.5 An area must be provided for pouches to be hung under cover.

8.4.6 Fresh clean water must be available at all times.

Guidelines

8.4.7 Pre-release housing for small macropods (e.g. bettongs) should be a minimum of 6 metres long, 6 metres wide and have fencing 1.2 metres high.

8.4.8 Pre-release housing for medium-sized macropods (e.g. swamp wallaby) should be a minimum of 30 metres long, 20 metres wide and have fencing 1.8 metres high (maximum 10 macropods). For each additional macropod in the enclosure over the maximum, increase the housing footprint by 60 square metres.

8.4.9 Pre-release housing for large-sized macropods (e.g. grey kangaroos) should be a minimum of 60 metres long, 40 metres wide and have fencing 1.8 metres high (maximum 10 macropods). For each additional macropod in the enclosure over the maximum, increase the housing footprint by 240 square metres.

8.4.10 Pre-release housing for bettongs and potoroos should have an inward-facing overhang to stop the macropod from climbing.

8.4.11 Small macropods (e.g. bettongs) should have predator-proof housing (e.g. from pythons and birds of prey) and may require wire-mesh roofing.

9. Suitability for release

9.1 Preparations for release

Objective

To ensure the macropod is physically fit and has the appropriate survival skills before its release. Preparations for release will start at the time of rescue and continue throughout the rehabilitation process. Many species will gradually lose their survival skills in captivity, so it is vital their time in care is kept to a minimum.

Standards

9.1.1 A macropod must not be released until it is physically ready.

This status has been achieved when:

- it has recovered from any injury or disease or veterinary procedure
- its weight and condition (i.e. body score) are within the appropriate range for that species, age and sex
- it has appropriate fitness levels as determined by both passive observation and active assessment (e.g. by encouraging the macropod to exercise and noting recovery time)
- it has acclimatised to prevailing climate conditions.

9.1.2 A macropod must not be released until it is behaviourally ready. This status has been achieved when:

- it can recognise and consume appropriate, naturally available food and water
- it can recognise and avoid predators, including pets
- it is not attracted to humans (i.e. humanised) or sights, sounds or smells that are specific to captivity (i.e. not imprinted)
- it can navigate effectively through its natural environment
- it can recognise and interact normally with members of its own species.

9.1.3 A macropod's readiness for release must be confirmed either by a veterinarian or experienced macropod rehabilitator.

9.1.4 In cases where an animal is determined to be non-releasable, the wildlife rehabilitation provider must:

- consider euthanasia (see Section 5: Euthanasia)
- if euthanasia is not considered appropriate, contact the Wildlife Team (wildlife.licensing@environment.nsw.gov.au) and apply for permanent care
- notify the Wildlife Team (wildlife.licensing@environment.nsw.gov.au) to arrange placement with an authorised animal exhibitor licensed by DPI.

Guidelines

9.1.5 Species that manipulate their physical environment (e.g. bettongs make a nest in grass, wallabies hide in native vegetation) should begin to exhibit this behaviour before release.

10. Release considerations

10.1 Timing of release

Objective

To ensure a macropod is released as soon as it is ready and at a time that minimises stress and maximises its chances of survival in its natural habitat.

Standards

10.1.1 Once a macropod is deemed ready for release, it must be released as soon as conditions are suitable (see below for what suitable conditions are).

10.1.2 A hand-reared macropod must be released based on both stage of development and its weight, and before sexual maturity. This will vary between species.

10.1.3 A macropod must not be released during extremes of temperature and storms.

10.1.4 A macropod must be released at a time of day with adequate residual daylight to enable it to visually investigate its environment.

Guidelines

10.1.5 A macropod should be released at a time of year that facilitates survival and reintegration into the wild population. For example:

- juvenile animals should be released during their natural dispersal period
- omnivorous species (bettongs and potoroos) should be released during periods of high insect abundance (e.g. spring and summer).

10.2 Release site selection

Objective

To ensure the wild population and natural environment are not negatively impacted by the release of the macropod, and the released macropod has the highest likelihood of survival.

Standards

10.2.1 If the exact location where the macropod was found is known and assessed as a suitable environment for release, it must be released there. A suitable environment for release is one that:

- contains appropriate habitat and adequate food and water resources
- is occupied by members of the same species
- does not place the animal at risk of injury or disease
- has infrastructure for post-release support for macropods if required (see Section 10.3: Release techniques)
- has no evidence of infection or health issues within the wild population.

10.2.2 If the location where the macropod was found is assessed as an unsuitable environment for release, it must be released in a suitable environment as near as possible to this location.

10.2.3 If there is no information about where the macropod was found, it must not be released.

10.2.4 In cases where there is no suitable release site, the wildlife rehabilitation provider must:

- consider euthanasia (see Section 5 Euthanasia)
- if euthanasia is not considered appropriate, contact the department and apply for permanent care
- notify NPWS to arrange placement with an authorised animal exhibitor licensed by DPI.

10.2.5 A macropod can only be released in a park if:

- it was originally encountered in that location
- written consent for the release has been obtained from the relevant NPWS Area Manager (issued under s.11 of the National Parks and Wildlife Regulation 2019)
- the release complies with the relevant Department of Planning, Industry and Environment policies on translocation.

These conditions also apply to the release of a macropod in a location where it might reasonably be expected to immediately enter a park (e.g. on a road or property adjoining a park).

Guidelines

10.2.6 A macropod should be released in an area that is connected to other suitable habitat.

Note

Wildlife rehabilitators who propose to release a macropod outside these standards and guidelines require additional approval. Contact the Wildlife Team via email at wildlife.licensing@environment.nsw.gov.au

10.3 Release techniques

Objective

The use of release techniques that ensure the released macropod has the highest likelihood of survival. Information is collected regarding the rehabilitated macropod's fate after release so the relative merits of different rehabilitation and release techniques can be compared.

Standards

10.3.1 Social species that are hand-reared (e.g. kangaroos or wallaroos) must be released near or into a mob.

10.3.2 Hand-reared macropods that have been in care for extended periods of time and sedated for transport to a ‘hard’ release site must be monitored until all signs of sedation have worn off, to protect them from predators.

Guidelines

10.3.3 Hand-reared macropods that have been in care for extended periods of time should be provided with temporary post-release support (‘soft’ release). This may include supplementary feeding, shelter provision or protection from predators.

10.3.4 Hard release is not the preferred release technique; however, the release site should be monitored after release if used.

10.3.5 Social species should be released with members of the same species.

10.3.6 Macropod rehabilitators should not release large numbers of individuals at a single location, as increased competition is likely to have a detrimental effect on the existing population.

10.3.7 Wildlife rehabilitators should arrange for macropods to be tagged or microchipped for individual identification before release. Wildlife rehabilitation providers and zoological parks are encouraged to participate in post-release monitoring programs to determine survivorship.

Note

All research involving protected animals requires a licence issued under the BC Act and approvals as specified in the *Animal Research Act 1985*.

11. Training

11.1 Requirements

Objective

To ensure wildlife rehabilitators have appropriate knowledge and skills to ensure the welfare of macropods in their care.

Standards

11.1.1 New wildlife rehabilitators must undertake an introductory training course.

11.1.2 Before undertaking macropod rehabilitation, a person must undertake specialist training.

11.1.3 A specialist training course must:

- teach the standards and guidelines described in this code
- focus on what a person will be able to do as a result of completing the course (i.e. be competency-based)
- teach health and safety issues associated with macropod rehabilitation (e.g. disease transmission, managing hazardous chemicals, and operating in dangerous locations and times)
- have a written assessment component.

11.1.4 Wildlife rehabilitators must be assessed as competent in the relevant areas before undertaking rescue, rehabilitation or release of particular species.

11.1.5 Training must be accompanied by ongoing in-field support from an experienced macropod rehabilitator.

11.1.6 All wildlife rehabilitators must undertake professional development and refresh their training for macropods every three years, e.g. completing a refresher or advanced training course, or attending a macropod advanced training conference, seminar or online course.

Guidelines

11.1.7 Wildlife rehabilitators should have an understanding of:

- the objectives of macropod rehabilitation
- wildlife ecology (e.g. population dynamics, habitat selection, competition, and predator–prey interactions)
- animal behaviour (e.g. feeding, predator avoidance and social interactions)
- how to keep accurate records.

11.1.8 Wildlife rehabilitators should be proficient in:

- species identification
- macropod handling techniques
- first aid for injured macropods
- recognising the signs of disease, stress and recovery
- animal husbandry.

Notes

- The department has prepared Macropod Rehabilitation Training Standards for the Volunteer Wildlife Rehabilitation Sector, including a macropod trainer's guide to ensure volunteers are trained to be competent in implementing this code.
- Attendance at macropod conferences or seminars may require pre-approval from a wildlife rehabilitator's group training coordinator to be eligible for consideration.

12. Record keeping

12.1 Keeping a register

Objective

To maintain a database of macropods that have entered rehabilitation, to inform improved rehabilitation outcomes for individual animals, and contribute to our knowledge of the ecological viability of macropod species.

Standards

12.1.1 Licensed wildlife rehabilitation providers, zoological parks and individuals must maintain a current register of all macropods reported, encountered or rescued. The register must contain the following information on each animal:

- encounter details (date, location, encounter circumstances, the animal's condition and unique ID number)
- species data (species name, sex, stage of development, initial weight and pouch condition)
- care providers (name and address of the initial assessor, name and address of the macropod rehabilitator)
- fate details (date, final disposition, location and any permanent marking).

These records must be submitted to the Wildlife Team (wildlife.licensing@environment.nsw.gov.au) once a year, using an approved electronic template.

12.1.2 Macropod rehabilitators must record the weight of macropods in their care so changes can be quickly identified (weighing frequency will depend on the type of care provided; see Section 6.2: Monitoring).

12.1.3 When an individual macropod is transferred to another wildlife rehabilitator or organisation for any reason, copies of its records must be transferred with it.

Guidelines

12.1.4 Wildlife rehabilitators should record the following additional information at the time of rescue:

- who discovered the macropod (name and contact details)
- when the macropod was discovered (time of day)
- any treatment provided before transport.

12.1.5 Macropod rehabilitators should record the following additional information at the time of assessment by a veterinarian or experienced macropod rehabilitator:

- details of wounds, injuries, diseases and external parasites
- details of mobility
- details of abnormal behaviour
- recommended management (e.g. euthanasia or prescribed treatment).

12.1.6 Macropod rehabilitators should record the following additional information at the time of entry into a rehabilitation facility:

- standard length measurements
- identifying features if the macropod is to be housed communally
- housing (e.g. intensive care, intermediate care or pre-release) (see Section 8: Housing).

12.1.7 Macropod rehabilitators should record details of the following daily care information:

- the type and quantity of food and liquid ingested
- treatment (e.g. medication, therapy)
- instructions from veterinarians and species coordinators
- changes to general fitness and behaviour
- enclosure cleaning (e.g. quantity and quality of faeces and urine).

12.1.8 Wildlife rehabilitators should record the following additional information regarding fate:

- if released, details regarding the type of release (hard or soft)
- if released, details regarding the condition of the animal (e.g. weight)
- tag number or microchip number (or both).

12.1.9 Macropod rehabilitators should keep duplicates or backups of records to avoid information being lost.

12.1.10 If the death of a macropod is suspected to be the result of an act of cruelty, the macropod rehabilitator should immediately contact their wildlife rehabilitation provider who will then advise the appropriate authorities.

12.1.11 If the death of a macropod is suspected to be the result of a serious disease outbreak, the macropod rehabilitator should immediately contact their group's species coordinator to ascertain whether tissue analysis or a necropsy is required. The DPI Emergency Animal Disease Hotline (24 hours) on 1800 675 888 must be notified immediately.

12.1.12 Sightings of macropods that are not in need of rescue, should be uploaded to NSW BioNet and should contain encounter details (date, location, encounter circumstances and a unique ID number) as well as whether the macropod was alive or dead.

13. Further reading

Commonwealth of Australia 2008, *National Code of Practice for the Humane Shooting of Kangaroos and Wallabies for Non-commercial Purposes*, Department of the Environment, Water, Heritage and the Arts, Canberra ACT.

Dawson TJ 1995, *Kangaroos: Biology of the Largest Marsupials,* Cornell University Press, Ithaca, NY, USA.

DPIE 2020, *Rehabilitation of Protected Native Animals Policy*, NSW Department of Planning, Industry and Environment, Parramatta NSW.

Frith HJ & Calaby JH 1969, *Kangaroos*, CSIRO Division of Wildlife Research, Cheshire Publishing Pty Ltd, Melbourne Canberra Sydney.

Hume ID 1999, *Marsupial Nutrition*, Cambridge University Press, Cambridge UK.

Richardson K 2012, *Australia's Amazing Kangaroos: Their Conservation, Unique Biology and Coexistence with Humans*, CSIRO Publishing, Collingwood Victoria.

Tyndale-Biscoe H & Renfree M 1987, *Reproductive physiology of Marsupials*, Cambridge University Press, Cambridge UK.

Vogelnest L & Portas T (eds) 2019, *Current therapy in medicine of Australian mammals* CSIRO Publishing, Clayton South Victoria, Australia.

Vogelnest L & Woods R (eds) 2008, *Medicine of Australian Mammals*, CSIRO Publishing, Collingwood Victoria.

Appendices

Appendix 1: Macropod species relevant to this code

Bionet Atlas code	Common name	Scientific name	BC Act 2016 NSW listing	EPBC Act 1999 federal listing
Kangaroos, wallabies and pademelons				
1263	Western grey kangaroo	*Macropus fuliginosus*		
1265	Eastern grey kangaroo	*Macropus giganteus*		
1275	Red kangaroo	*Osphranter rufus*		
1245	Parma wallaby	*Macropus parma*	Vulnerable	
1259	Whiptail wallaby	*Macropus parryi*		
1215	Brush-tailed rock-wallaby	*Petrogale penicillata*	Endangered	Vulnerable
1260	Black-striped wallaby	*Macropus dorsalis*	Endangered	
1266	Common wallaroo	*Osphranter robustus*		
1261	Red-necked wallaby	*Notamacropus rufogriseus*		
1234	Red-legged pademelon	*Thylogale stigmatica*	Vulnerable	
1236	Red-necked pademelon	*Thylogale thetis*		
1242	Swamp wallaby	*Wallabia bicolor*		
1205	Yellow-footed rock-wallaby	*Petrogale xanthopus*	Endangered	Vulnerable
Bettongs and potoroos				
1187	Rufous bettong	*Aepyprymnus rufescens*	Vulnerable	
1179	Long-footed potoroo	*Potorous longipes*	Critically endangered	Endangered
1175	Long-nosed potoroo	*Potorous tridactylus*	Vulnerable	Vulnerable
1175	Long-nosed potoroo, Cobaki Lakes and Tweed Heads West population	*Potorous tridactylus*	Endangered population	Vulnerable