



Standards for wildlife rehabilitation in Western Australia

Wildlife Rehabilitators Consultation Group



Department of
Parks and Wildlife



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The first edition of the *Minimum Standards for Wildlife Rehabilitation*, on which these Standards are based, resulted from the suggestions and contributions of many wildlife rehabilitators via consultation. These Standards were compiled by Lee Hollingsworth for the Department of Parks and Wildlife, following review by the Western Australian Wildlife Rehabilitators Consultation Group.

The Department of Parks and Wildlife wishes to acknowledge the significant contributions made by the Western Australian wildlife rehabilitation groups and individuals. Without their expertise and knowledge we would not have these comprehensive *Standards* to work with. This was no small task and we thank them for their many efforts.

WILDCARE helpline

FOR SICK, INJURED OR ORPHANED NATIVE WILDLIFE



Department of
Parks and Wildlife



(08) 9474 9055

FOREWORD

Western Australia is one of the most biologically diverse regions in the world, and home to some species found nowhere else on earth. The south-west of WA is one of the world's 34 internationally recognised terrestrial hotspots for biodiversity and the only one recognised in Australia.

The State comprises a 2.5 million square kilometre mainland; more than 12,800km of coastline, over 20,800km when island coastlines are included; more than 3700 offshore islands; 26 of Australia's 80 bioregions, from sub-alpine areas to tropical rainforest and desert; 141 of Australia's 207 mammal species, 25 of which are unique to WA; 439 reptile species, 187 of which are unique to WA; and 518 of the 760 bird species recorded in Australia, 14 of which are unique to WA.

On occasion, events lead to sick, injured and orphaned native wildlife. The management of injured wildlife is a shared responsibility across the community, but there are special people who volunteer to help wildlife recover so that they can be returned to the wild. Hundreds of people across WA perform this valuable community service.

To assist rehabilitators in this task, the Department of Parks and Wildlife is pleased to provide these *Standards for Wildlife Rehabilitation in Western Australia*.

The Wildlife Rehabilitators' Code of Ethics is an integral part of these *Standards*, incorporating the principles of high standards of wildlife care, responsibility, integrity, compassion, safe working environments and professionalism. These *Standards* represent a benchmark for wildlife rehabilitation providing useful guidance for rehabilitators and associated organisations.

This document reflects many years of knowledge and experience from volunteer wildlife rehabilitators, veterinarians and Parks and Wildlife staff in the care and rehabilitation of sick, injured and orphaned wildlife. The *Standards* are based on accepted veterinary practices, personal observations, common sense, good judgement and many thousands of hours of dedicated commitment. The document will continue to be reviewed and updated periodically as new techniques become available. I encourage all wildlife rehabilitators and other interested parties to provide feedback and comments for consideration in future editions.



Jim Sharp
DIRECTOR GENERAL
DEPARTMENT OF PARKS AND WILDLIFE

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CODE OF ETHICS

A Wildlife Rehabilitator's Code of Ethics:

1. A wildlife rehabilitator should strive to achieve high standards of animal care through knowledge and an understanding of the field. Continuing efforts must be made to keep informed of current rehabilitation information, methods and regulations.
2. A wildlife rehabilitator should be responsible, conscientious and dedicated, and should continuously work toward improving the quality of care given to wild fauna undergoing rehabilitation.
3. A wildlife rehabilitator must abide by local, State and Federal laws concerning wildlife, wildlife rehabilitation and associated activities.
4. A wildlife rehabilitator should establish safe work habits and conditions, abiding by current health and safety practices at all times.
5. A wildlife rehabilitator should acknowledge limitations and enlist the assistance of a veterinarian or other trained professional when appropriate.
6. A wildlife rehabilitator should respect other rehabilitators and persons in related fields, sharing skills and knowledge in the spirit of cooperation for the welfare of all fauna.
7. A wildlife rehabilitator should place optimum animal care above personal gain, with the primary goal to rehabilitate wildlife for release back into the wild within the natural range of that species.
8. A wildlife rehabilitator should strive to provide professional and humane care in all phases of wildlife rehabilitation, respecting the wildness and maintaining the dignity of each animal in life and in death. Releasable fauna should be maintained in a wild condition and released as soon as appropriate. Non-releasable fauna that are inappropriate for remaining in captivity should be euthanased.
9. A wildlife rehabilitator should encourage community support and involvement through volunteer training and public education. The common goal should be to promote a responsible concern for living beings and the welfare of the environment.
10. A wildlife rehabilitator should work on the basis of sound ecological principles, incorporating appropriate conservation ethics and an attitude of stewardship.
11. A wildlife rehabilitator should conduct all business and activities in a professional manner, with honesty, integrity, compassion, and commitment, recognising that an individual's conduct reflects on the entire field of wildlife rehabilitation.

The Department of Parks and Wildlife encourages the recommended basic principles which should guide our actions where we have guardianship or other influence over the welfare of any fauna. These should be considered in terms of the following five freedoms:

- 1. Freedom from hunger and thirst**
By providing fresh water and a diet to promote full health and vigour.
- 2. Freedom from discomfort**
By providing a safe environment with shelter.
- 3. Freedom from pain, injury or disease**
By rapid diagnosis and, treatment and prevention through rigorous hygiene standards.
- 4. Freedom from fear and distress**
By minimising handling and providing a suitable environment and efficient treatment.
- 5. Freedom to behave naturally**
By providing sufficient space and proper facilities.

PURPOSE

The purpose of these *Standards* is to ensure the welfare of native fauna in all stages of the wildlife rehabilitation process and maximise the potential to return native fauna to the wild.

Wildlife rehabilitation is defined as the temporary care of sick, diseased, injured or orphaned wildlife for the purpose of caring for it until it recovers or becomes capable of fending for itself.

Animals are defined as any live, non-human vertebrate e.g. fish, amphibian, reptile, bird or mammal.

For the purpose of these *Standards*, fauna is defined as in the *Wildlife Conservation Act 1950*, as amended, as meaning – *any animal indigenous to any State or territory of the Commonwealth of Australia or the territorial waters of the Commonwealth, and any animal that periodically migrates to and lives in any State or territory of the Commonwealth or the territorial waters of the Commonwealth and any animal declared as fauna pursuant to the Act.*

These *Standards* are a cooperative effort that represent the most current knowledge, expertise and techniques in our field. They are a reflection of what we have learned collectively and have successfully applied. All rehabilitators are encouraged to explore and understand the principles underlying these standards, and to apply them in the everyday care of wild fauna. Minimum standards for wildlife rehabilitation apply not only to the facilities used for rehabilitation, but also to all aspects of the work involved.

The *Standards for Wildlife Rehabilitation in WA* is a document created by and for wildlife rehabilitators. This document is intended to help increase the number of rehabilitated wildlife successfully returned to wild populations by providing:

- recommendations and information regarding wildlife care
- minimum standards for rehabilitation
- mechanisms for self-evaluation.

These *Standards* do not apply to any fauna kept beyond the normal scope of wildlife rehabilitation. Fauna that is kept for educational display, research or captive breeding purposes have different requirements based on the needs of the individual. Those specific needs are not addressed in this document.

This information is available on the Department of Agriculture, Fisheries and Forestry website or via the Department of Parks and Wildlife website (www.dpaw.wa.gov.au).

The *Standards* is a living document that is updated constantly as the field of wildlife rehabilitation grows and improves. The procedures and cage sizes described herein have been provided by experienced wildlife rehabilitators, and are considered to be **MINIMUM** standards i.e. more detailed procedures or larger cages are certainly acceptable and encouraged.

Because wild fauna undergoing rehabilitation are individuals, each with different needs based on injuries and unique behaviours, recommended cage sizes and techniques may not apply to every case.

The wildlife rehabilitator is encouraged to improve techniques for housing, pre-release conditioning and other aspects of the rehabilitation process, so long as basic natural biology, comfort and hygiene needs are met. Cage dimensions can be modified to accommodate special needs of the facility, fauna or new advancements in the field.

This document is a foundation upon which each wildlife rehabilitator can build an appropriate and effective system. The goal is to give fauna the best chance of post-release survival in its natural place in the wild. Wildlife rehabilitators should combine information from these *Standards* with wildlife course material, current publications, veterinarians, experienced mentors and personal experience, along with common sense and good judgment to make the best decisions for each individual case. All rehabilitators are encouraged to improve upon these standards as they strive to provide the best possible care.

An effort should be made by the rehabilitator to obtain as much information as possible through reference and natural biology literature and contact with other rehabilitators. Through an understanding of each species' behaviour and natural biology, proper choices can be made to provide suitable temporary captive housing and habitats.

All rehabilitators should be prepared to provide temporary housing for any species they are likely to encounter, including those species rarely encountered.

The Wildlife Conservation Act and Regulations govern the activities of wildlife rehabilitators in Western Australia. The Department of Parks and Wildlife has responsibility for implementing that legislation and the policies that affect the management of wildlife. Wildlife rehabilitators are asked to ensure that they work with Parks and Wildlife in its efforts to manage sick, injured and orphaned wildlife in accordance with the legislation.

The Wildlife Rehabilitator's Code of Ethics is a part of these *Standards* and based on the principles of honesty, integrity, responsibility and treating others as we would have them treat us.

The Code of Ethics provides basic rules of conduct for each of us to incorporate into our practice. The resulting self-respect, peer respect, community respect and credibility will increase our overall effectiveness in animal care, networking, fundraising, volunteer management, educational efforts as well as all aspects of wildlife rehabilitation. Ethical and professional conduct by each wildlife rehabilitator will also contribute significantly to the credibility of our field as a whole, which in turn will benefit all of us. We are proud of this collaborative effort. We encourage all wildlife rehabilitators to actively use this document to help improve the care, treatment and successful release of wildlife.

CHAPTER 1 – CHRONOLOGICAL OUTLINE OF THE REHABILITATION PROCESS

The goal of this section is to provide a blueprint for successful rehabilitation and guide the rehabilitator through the care and clinical process.

(1) Admission of fauna

- Gather history from the presenter of the fauna
- Record all information
- Provide relevant educational material to the presenter
- Report any Specially Protected Fauna, poisoning or gunshot victims to local Parks and Wildlife office within 72 hours
- Follow any instructions from Parks and Wildlife regarding Specially Protected Fauna
- Report any cluster deaths, illness or disease to local Parks and Wildlife office
- Reunite fauna with family if possible
- New admissions to be quarantined.

(2) Immediate care of the animal

- Evaluate the animal quickly when transferring to a holding box/pouch/cage etc
- Examine for critical conditions and administer emergency care as needed
- Provide quiet rest space in a quarantine area, separated from domestic animals and pet birds, human traffic and potential irritants such as cigarette smoke
- Domestic animals must not be in proximity to any wildlife under care where its presence will interfere with its care.

(3) Health assessment

- Weigh (there may be some reasonable limitations to weighing large animals)
- Visual exam
- Palpate limbs
- Examine whole of animal
- Assess nutritional status and body condition
- Visit to veterinarian if required
- Write treatment plan
- Consider release of fauna.

(4) Provision of treatments

- Provide fluids
- Manage wounds and/or injuries
- Administer medications
- Provide nutrition
- House in appropriate facility
- Employ appropriate techniques to minimise imprinting as required.

(5) Stage 1 – Intensive care

- Monitor weight on a daily basis
- Provide ongoing, appropriate nutrition
- Treat medical problems as needed
- Provide hygienic supportive housing and habitat
- Provide normal light/dark periods appropriate to the species
- Assess daily and move to Stage 2 when the animal has recovered enough to no longer need intensive care.

(6) Stage 2 – Acclimatisation

- Monitor weight as required
- Develop release plan as required
- Provide ongoing, appropriate nutrition
- Treat medical problems as needed (should be minimal)
- Climate acclimatisation
- Environmental acclimatisation
- Provide comfortable, hygienic, appropriate housing and habitat with mental stimulation
- Minimise interaction with human activity
- Provide environmental physical therapy as needed.

(7) Stage 3 – Pre-release conditioning

- Provide appropriate housing/environment, suitable to the species, which allows them to develop and conduct natural behaviours prior to release
- Monitor weight and general condition as required
- Minimise interaction with human activity
- Provide ongoing, appropriate nutrition, introducing a more natural diet
- Exercise daily, as appropriate for that species
- Provide weather acclimatisation.

(8) Release evaluation

- No evidence of disease
- Ability to recognise prey
- Ability to self-feed e.g. forage, catch live prey
- Normal mobility and function, reasonable level of physical fitness and stamina necessary for foraging, breeding or territory defence behaviour if predicted
- Normal behaviour (the animal exhibits natural responses to human activity, predator avoidance, exhibits normal socialisation with both same and other species)
- Normal weight/condition for that species/sex/season
- Adequate fitness levels as appropriate for species
- Suitable release sites available
- If animal requires follow up, please see local Parks and Wildlife office.

(9) Release

- Appropriate habitat and within its natural range for that species. Contact regional district Parks and Wildlife office to seek advice from a Wildlife Officer about suitable sites at time of release
- Choose appropriate season/time of year (migration, breeding season, etc)

- Choose appropriate time of day
- Identify forecasted weather for suitability
- Provide food if appropriate
- Provide proper/safe transportation
- Monitor post-release if possible.

Wildlife rehabilitation facilities review

Rehabilitation facilities and individual rehabilitators may benefit from doing a regular self-evaluation or self-review.

A checklist used to assist in this type of self-evaluation is found in Appendix A. The purpose of this checklist is to provide wildlife rehabilitators with a tool to use for checking the service they are providing to ensure wildlife receives appropriate housing and medical treatment, and to protect both wildlife and humans from disease and contamination by monitoring appropriate standards.

Not all items contained in the form will apply to everyone. For example, an independent rehabilitator working from home probably does not require a grievance committee, but this form does provide an easy reference to be sure important considerations are not overlooked when changes such as facility growth occur.

CHAPTER 2 – RECORDING AND REPORTING REQUIREMENTS

Records are a vital part of any rehabilitation program, and are particularly important when an individual or an organisation is trying to learn from previous work in an effort to improve the care given to wildlife.

Records should be kept on all animal admissions for a minimum of five years. Animal admission forms and animal examination forms can be used to ensure that vital information is gathered for each animal. An example of a Fauna Admission Form is found in Appendix B and an example of a Bird Examination Form is found in Appendix C.

Records can be consolidated for healthy litters or clutches of fauna raised for release. Daily forms for fauna by enclosure or cage are required to verify that food, medications and care are being provided. These records must be kept on file by the rehabilitator for future reference should this be required.

All fauna (dead or alive) that indicate suspected poisoning or other criminal activity should be reported to the Department of Parks and Wildlife immediately upon acquisition.

All Specially Protected Fauna (SPF), as listed in the Wildlife Conservation (Specially Protected Fauna) Notice, published yearly in the *Government Gazette* must be reported to a department Wildlife Officer or the WILDCARE Helpline number on (08) 9474 9055 within 72 hours.

This SPF list can be found on the State Law Publisher website (www.slp.wa.gov.au), or by contacting the Parks and Wildlife Nature Protection Branch on (08) 9219 9840 for a current copy.

Pursuant to the *Wildlife Conservation Regulations 1970*, Section 57 “Marking of wild fauna”, and the *Pet Herpetofauna Regulations*, in conjunction with a *Regulation 17 Licence to Take Fauna for Scientific Purposes*, a current licence is required from the department to mark fauna for identifying purposes post-release.

To make an application for a Regulation 23 Licence, the rehabilitator must write a letter of request to the Administrative Officer, Wildlife Licensing Section. The applicant would have to demonstrate that they are sufficiently experienced and trained and that their research and proposed method or means of capturing and marking fauna are satisfactory. They would also have to demonstrate that they will collect data on the outcome of the marking (sightings, microchip data) and make a report on this to the department as part of a scientific research program.

If fauna are marked in any way, the rehabilitator is no longer 'caring for sick or injured fauna' (Regulation 28A) but is conducting research. A rehabilitator must demonstrate to the department that they have the expertise to do this and that it has scientific merit.

Recordkeeping has been placed in two categories:

1. **Required information**
2. **Recommended information**

Required information

- Species, sex (if determined), age (estimate)
- Date and time rescued
- Date and time admitted
- Where found (exact location down to street number if possible)
- Name/address/phone number of presenter
- Any additional history e.g. what it has eaten (see appendix B)
- Causes for admission
- Initial weight
- Admission number
- Record of notifying the department in cases of Specially Protected Fauna, including who was notified, when and by what method (phone, fax or e-mail)
- Record of notifying the department in cases of fauna being shot, poisoned or falling victim to other illegal activity
- Final outcome, i.e. whether animal was released (including date, time and location):
 - Release weight
 - Transferred to whom (must supply name and address)
 - Placed with whom (must supply name and address)
 - Died, euthanased (disposal of carcass to WA Museum, Parks and Wildlife or buried/incinerated)
- Recipient information if transferred or placed:
 - Name, address, Parks and Wildlife permit number (if applicable)
 - Purpose of transfer (including the transfer or placement of carcasses for educational purposes)
- Permanent identification details e.g. band, microchip, where applicable
- Any additional information required by the department.

Recommended information

- Any additional history that may be provided by the presenter (regarding cause of injury, severity or time of injury/problem, any care given by the presenter, etc)
- Physical examination data
- Daily treatment information and ongoing notes
- Record of veterinary treatment (where applicable)
- In suspected poisoning cases, any additional information describing the site where the animal was found e.g. climate, other species present, circumstances, etc
- Information regarding cluster deaths should be reported to local Parks and Wildlife office or Wildlife Officer.

Coding standards

Coding standards should conform to specifications listed. The code letters used by wildlife rehabilitators and rehabilitation centres should be strictly defined for comparison purposes. Referenced categories should correspond to the following:

R (RELEASED): any healthy, recovered fauna that is returned to its natural habitat.

Note: released fauna does NOT include transferred, placed or pending fauna.

T (TRANSFERRED): all transferred fauna must be recorded in the wildlife rehabilitator's records.

- (1) Any animal transported to another facility or wildlife rehabilitator for further rehabilitation efforts.

(Note: if the animal is known to have been released by the receiving facility, it is still recorded as a 'T' by the original facility and as an 'R' by the receiving facility).

- (2) Any animal determined to be non-releasable while undergoing wildlife rehabilitation efforts that is placed in a non-rehabilitation situation.

NOTE: for Specially Protected Fauna, agency permission is **ALWAYS** required prior to transfer of live fauna. For long-term care of permanently incapacitated fauna the recipient must possess the proper approval and licence. Contact must be made with the local Wildlife Officer to confirm permission and/or approval.

For an individual centre's information, this can be further subdivided (optional) into:

TR (TRANSFERRED FOR REHABILITATION)

P (PENDING): any fauna still undergoing rehabilitation efforts. These fauna are only added to summary statistics after final resolution.

DIC (DIED IN CARE): any fauna that dies subsequent to any handling, exam, treatment, or implementation of lifesaving measures in the care facility.

DOA (DEAD ON ARRIVAL): any fauna that dies before any lifesaving measures or treatments can be implemented in the care facility.

EAC (EUTHANASED AFTER CARE): any fauna that is suffering or non-releasable that is euthanased.

EOA (EUTHANASED ON ARRIVAL): any fauna euthanased after an initial exam, without further treatment measures being done.

In the case of all Specially Protected Fauna, Parks and Wildlife Nature Protection Branch must be notified by phone, fax or email the first working day following the receipt of such an animal. Permanently incapacitated animals, i.e. physically or mentally impaired or imprinted animals, may not be suitable for release.

Consultation with Parks and Wildlife Nature Protection Branch is necessary to reach a decision in these cases.

Veterinary policy

The *Veterinary Surgeons Act 1960* precludes non-veterinarians from practising veterinary surgery or veterinary medicine. In instances where surgery or medicine needs to be administered and veterinarians are not able to directly examine the animal, the rehabilitator should make every effort to obtain veterinary advice.

The legal prescription of medical care for sick or injured wildlife is the responsibility of a veterinarian. The rehabilitator and their veterinarian need to apply to the Veterinary Surgeons' Board (VSB) for the rehabilitator to become an authorised person under Regulation 46 (3)(A) of the Veterinary Surgeons' Regulations 1979 to administer scheduled drugs, namely sedatives, tranquilisers and euthanasia agents only.

This then enables the veterinarian to dispense quantities of certain aforementioned drugs to the rehabilitator. The authorisation is active for a 12-month period and it is the responsibility of the veterinarian to audit drug usage for that period and provide a copy of the audit to the VSB prior to the VSB renewing the authorisation for a further 12-month period.

Following authorisation by the Board, such an arrangement may allow the veterinarian to prescribe a specific treatment protocol for a specific type of illness or injury without having to see each individual animal. This type of arrangement also requires that an appropriate veterinarian/rehabilitator relationship exists and has the following components:

- The veterinarian has assumed the responsibility for any medical judgments regarding the health of sick or injured wildlife and the need for medical treatments
- Furthermore, the veterinarian has current personal knowledge of the general conditions and care of wildlife in the rehabilitator's care.

The veterinarian and the rehabilitator must maintain a record of mutually agreed veterinary procedures and medications for the purpose of a yearly audit. The veterinarian should keep a record of the quantities of drugs dispensed, while the rehabilitator should keep a record of drugs administered and the reasons for administering.

The veterinarian is available for follow-up advice in case of adverse reactions or failure of the current treatment. Any agreement must abide by the laws and regulations governing the practice of veterinary medicine and surgery.

Feasibility and fate

Once fauna comes into rehabilitation it is faced with one of four fates:

- Death from its injuries or illness
- Permanent confinement due to factors preventing release
- Successful rehabilitation and release, or
- Euthanasia.

The following section addresses euthanasia.

Where possible a veterinarian should be consulted regarding the decision to euthanase.

Guidelines for determining when to euthanase wildlife

Euthanasia is recommended when any of the following apply:

- The welfare and quality of life of the animal is severely compromised.
- The animal is reasonably suspected to have an infectious disease that may pose a health risk to wild animals.
- There is no suitable release environment (see Section 10.2 Release site selection).

Birds

- A wing is missing or will require amputation.
- A foot or leg requires amputation.
- A wing, leg or foot is injured to the extent that normal flight or locomotion will never be regained.
- It is a passerine, raptor or owl with a missing rear toe.
- It has a recent injury to one or both eyes to the extent that vision will be significantly impaired or lost.
- Its beak is damaged to the extent that self-feeding is not possible (prosthetics must not be used as they are ineffective).
- It is suffering from an injury or disease that means full mobility is not expected to return within three months. An exception may be made provided rehabilitation is undertaken according to a written management plan endorsed by a veterinarian.

Reptiles and amphibians

- A limb is recently missing or will require amputation and this will severely limit locomotion/swimming.
- It has a recent injury to one or both eyes to the extent that vision will be significantly impaired or lost.
- It is a turtle with an irreparable crack in its carapace and/or plastron involving displaced or missing segments, or exposure of the body cavity.
- It is an amphibian diagnosed with Chytrid fungus.
- It is suffering from an injury or disease that means full mobility is not expected to return within three months. An exception may be made provided rehabilitation is undertaken according to a written management plan endorsed by a veterinarian.

Mammals

- A limb is missing or requires amputation and this is reasonably expected to impair the animal's ability to survive in the wild.
- It has a recent injury to one or both eyes to the extent that vision will be significantly impaired or lost.
- It is suffering from an injury or disease, such that full mobility is not expected to return within three months. An exception may be made provided rehabilitation is undertaken according to a written management plan endorsed by a veterinarian.

Mammals (arboreal)

- It is a species with a prehensile tail and the tail is either missing or requires amputation.
- It is an adult suffering from severe exudative dermatitis to the extent that a prolonged treatment period is required.

Mammals (macropods)

- The tail is injured to the extent that normal locomotion is permanently impeded.

Fauna should not be considered for release if they are permanently incapacitated and not likely to survive in the wild. Incapacities include, but are not limited to, impaired vision, lack of fitness, no experience in natural environment, amputated or poorly healed broken limbs, imprinting, or having a high likelihood of infecting wild fauna with disease. There are other reasons that may preclude fauna from being released and affected animals may also be candidates for euthanasia.

Euthanasia by chemical overdose is the preferred method for most classes of fauna but must only be carried out by a veterinarian or person authorised by the Veterinary Surgeons Board under the supervision of a veterinarian.

Acceptable euthanasia methods

Euthanasia is defined as the induction of death with minimal pain, stress or anxiety. Wildlife rehabilitators who direct the operation of a facility must make these decisions, as well as supervise the euthanasia procedures. They must also exhibit understanding and compassion for those who have been involved with the case.

While no ideal euthanasia agent exists, the procedure of choice should (as much as possible):

- produce rapid loss of consciousness and death
- exhibit consistent and predictable action
- be easily and safely administered by properly trained personnel
- cause minimal psychological stress to the animal
- cause minimal emotional effects to observers and participants
- not be subject to abuse by humans
- interrupt consciousness and reflexes simultaneously
- not cause a sanitation or environmental problem

- be economical and readily available.

The method of euthanasia is only as humane as the knowledge and skill of the operator performing it. The safety of the operator shall be given as much consideration as the humaneness of the method.

Below is a brief description of the accepted methods of euthanasia recommended for use in wildlife as documented in the “Euthanasia of Animals Used for Scientific Purposes”, 2nd edition, produced by The Australia & New Zealand Council for the Care of Animals in Research and Teaching Ltd (ANZCCART).

Refer to Table 1, identifying acceptable methods for various species. None of these methods should be used without proper training and, in the case of regulated substances, without proper licensing. Each wildlife rehabilitator is urged to seek and learn to use those methods which he/she feels are humane and within their legal and practical limits.

Acceptable physical methods of euthanasia

Cervical dislocation:

Causes death by severing the spinal cord and destroying ascending sensory (pain) pathways, resulting in depression of central nervous system (CNS), respiratory and cardiac functions. Grasping the body and the base of the skull, the neck is hyper-extended. The neck is rotated in a down and away motion relative to the body position using the thumb and forefingers, separating the first cervical vertebra from the base of the skull and severing the spinal cord.

Advantages: clean; safe to perform; moderately rapid; special equipment not required.

Disadvantages: must be performed by skilled personnel. May be aesthetically objectionable to staff/volunteers/public. Should only be performed on small birds and mammals; may remain conscious for a brief period following dislocation (may convulse prior to death).

Decapitation:

NOTE: this is not an acceptable sole method of euthanasia for reptiles as they can be fully conscious after decapitation. It is recommended that Blunt Force Trauma (BFT) is carried out first, followed by decapitation.

Advantages: moderately rapid; effective in reptiles, though movement may continue following decapitation.

The brain of reptiles must also be pithed (severing of the spinal cord) or otherwise destroyed to ensure that there is no residual brain activity.

Disadvantages: must be performed by skilled personnel. May be aesthetically objectionable to staff/volunteers/public. Should only be performed on small

fauna; the fauna may remain conscious for a brief period following decapitation (may convulse prior to death).

Gunshot:

Causes immediate unconsciousness by direct and rapid destruction of brain tissue when positioned properly.

Advantages: rapid; can be used on most species.

Disadvantages: must be performed by skilled personnel. Requires special equipment and will require firearm permit. May be aesthetically objectionable to staff/volunteers/public. Potential for human injury.

Penetrating captive bolt:

Causes immediate unconsciousness by direct and rapid destruction of brain tissue when positioned properly. Bolt is positioned properly against the skull and fired. This is one of the few options for euthanasing large ruminants and carnivores.

Advantages: rapid.

Disadvantages: must be performed by skilled personnel. Requires special equipment and may require permit.

May be aesthetically objectionable to staff/volunteers/public. Must be done at close range (nearly direct contact to the animal's skull) and the animal must be properly restrained or sedated to ensure accuracy.

Adjunct physical methods:

(should not be used as sole method):

Stunning (blunt force trauma):

Striking of the skull, resulting in unconsciousness of the animal. **NOTE:** It is recommended that Blunt Force Trauma (BFT) is carried out first, followed by decapitation.

Advantages: rapid unconsciousness.

Disadvantages: not a sole method of euthanasia – usually followed by exsanguination (bleeding out); requires skill to be done properly; may be aesthetically unappealing; should not be used if the brain must be examined (as with suspect Lyssavirus cases), or decapitation.

Chemical methods (inhaled agents):

Carbon dioxide: Causes death by irreversibly binding with haemoglobin in the red blood cells.

Advantages: rapidly acting gas that can be used with minimal handling of fauna; easily available in compressed cylinders; is rapid.

Disadvantages: hazardous to human health; requires specialised equipment and training; useful for small fauna in chambers.

Table 1: Recommended techniques for humane euthanasia of fauna by Parks and Wildlife personnel

RECOMMENDED TECHNIQUES FOR THE HUMANE EUTHANASIA OF ANIMALS BY PARKS AND WILDLIFE PERSONNEL UNDER FIELD CONDITIONS						
	Technique: Y = Recommended N = Not recommended					
	Stunning or anaesthesia followed by				Carbon dioxide inhalation	Shooting
Species	Blunt force trauma	Cervical dislocation	Decapitation	Spinal severance and brain destruction		
Rabbits	Y	Y	Y		Y Baby up to 3 weeks	Y
Dingoes/dogs	Y				Y Pups	Y
Cats	Y				Y	Y
Bats	Y	Y	Y Neonates only		Y	
Small mammals	Y	Y	Y Neonates only		Y	N
Kangaroos and wallabies	Y	Y Pouched young	Y Pouched young		Y Quokkas only	Y Brain shot
Birds	Y	Y Chicks, small and medium sized adults only	N		Y Chicks, small and medium sized adults only	Y Large species 3kg and over only
Lizards and snakes	Y	N	N	Y	N	N
Tortoises and turtles	Y	N	Y		N	N
Crocodiles	Y Juveniles	N	Y Juveniles	Y Juveniles	N	Y Brain shot only
Amphibians	Y	N	Y	Y	N	N
Fish	Y	Y Small fish only	Y	Y	N	
Mice and rats	Y	Y over 150g must be stunned first	Y Neonates only		Y	N
Cetaceans, sirenians and pinnipeds	N	N	N		N	Y Brain shot for small species Y Explosives for large species

(From Chapman, T. Sims C & Mawson P. (2005). *Minimising Disease Risk in Wildlife Management*. Department of Environment and Conservation. pp: 37)

Non-acceptable methods of euthanasia

(Methods considered inhumane and/or unacceptable for euthanasia of wildlife)

Many techniques have been used to euthanase wild fauna, but many of these are also considered inhumane (therefore not true euthanasia) or extremely dangerous, and are not condoned under these *Standards*. Methods which are not approved for use in wildlife are:

Methods not acceptable for any reptile:

- Decapitation **alone** (must be used alongside blunt force trauma)
- Stunning or blow to the head **alone** (must be used alongside decapitation)
- Intracardiac (directly to heart), intramuscular (into muscle), intracoelomic (abdominal cavity), intrahepatic (in the liver) and intrapulmonary (in the lungs) injection of sodium pentothal without prior anaesthesia
- Inhalation anaesthetics such as halothane, isoflurane, methoxyflurane, carbon dioxide **alone**.

Hypothermia

Cooling (3–4°C) will reduce a reptile's metabolism and reduce locomotion and hence facilitate handling. However, it should be remembered that cooling does not reduce the ability to feel pain. It has been stated that cooling (followed by freezing) is not acceptable for euthanasia in animals as there may be an initial period of discomfort due to ice crystal formation, both on the skin and within the body. Euthanasia of reptiles by injectable agents or by physical methods is preferable.

In addition, the following are not considered to be acceptable forms of euthanasia for any animal:

- Air embolism (injecting air into a vessel)
- Decompression (suffocation)
- Burning
- Drowning
- Carbon monoxide (e.g. car exhaust)
- Exsanguination (allowing an animal to bleed to death)
- Chloral hydrate
- Household product and solvents
- Chloroform
- Neuromuscular blocking agents
- Cyanide
- Strychnine.

(Reilly, J (2001) Shea, Vogelneust and Woods, (2000)).

Signs of death:

- Absence of respiratory movement – this sign not sufficient alone as the heart may continue to beat for some time.
- Absence of heart beat – determined by a stethoscope or by palpation (feeling) of the chest
- Absence of pulse – is of most use in the larger species, being impossible to discern by palpation in small species.
- Loss of colour in mucous membranes (the linings inside the eyelids, the gums and inside the rectum or cloaca) – after death the mucous membranes become pale and do not become pink again after pressure is applied. They become dry and sticky.
- Corneal and palpebral reflexes are lost – the corneal reflex is elicited when the eyeball is touched and the palpebral reflex is elicited when the eyelids are poked.
- Glazing of the eyes – will occur rapidly after death. The surface of the eye loses its clear moist appearance and becomes opaque, dry and perhaps slightly wrinkled.

Post mortems:

A post mortem may be performed by the rehabilitator and used as a teaching opportunity. However, appropriate PPE (personal protective equipment) such as gloves, mask and eyewear should be worn to reduce the risks to the rehabilitator of contracting a zoonotic disease.

Carcasses that do not undergo a post mortem may be transferred to local natural biology museums, universities or other institutions for study and/or addition to their collections if samples are requested.

The wildlife rehabilitator may contact these institutions and arrange for proper handling of the carcasses so that the institutions can gain the most benefit from them (e.g. carcasses may need to be frozen, placed in formalin etc). Specific data may also need to be recorded by the rehabilitator, such as date and location animal was found, live body weight etc. In many cases, the information provided by the rehabilitator can be as valuable as the specimen itself. The department must be contacted and a plan determined for the post mortem or removal of all Specially Protected Fauna.

If the wildlife rehabilitator wishes to keep specific parts or portions of carcasses including eggs, larvae, semen, carcass, skin, plumage or fur for educational purposes they must contact Parks and Wildlife's Nature Protection Branch for advice.

Consideration will be given to issuing a letter of authorisation to keep such items. Special letters are not required for the rehabilitator to possess feathers for imping purposes (where unbroken feathers from one bird are used to repair the feathers of another).

Disposal of carcasses and animal waste products

Fauna that dies or is euthanased while under the care of a wildlife rehabilitator should always be examined carefully to confirm that the animal really is dead (see previous). If in any doubt, consultation with veterinary staff is recommended. The rehabilitator may be required to transfer the carcasses of Specially Protected Fauna to a specified location. Bats that have had a significant contact with a person (e.g. bite, scratch or exchange of bodily fluid) must be transported to the Animal Health Laboratories at the Department of Agriculture and Food for viral disease examination.

All other carcasses and all animal waste products should be disposed of in accordance with acceptable practices as required by local council or shire by-laws. Carcasses and organic wastes suspected of disease contamination, or those that have been euthanased using potentially harmful chemical methods, such as sodium pentothal, should be deep buried or incinerated.

Burial of carcasses should be at a depth that will discourage scavenger species from unearthing them.

It is department policy that sick or injured fauna that has died or been euthanased must not be used to feed other fauna. This policy is incorporated as a condition in most of the fauna keeping licences issued by the department.

Section 16 of the *Wildlife Conservation Act 1950*, provides information on the taking of protected fauna, while section 16A makes it an offence to possess fauna that has not been lawfully taken.

CHAPTER 3 – HUMAN HEALTH RISKS

Much is known about specific wildlife diseases, but there are many diseases that are unknown. This is why the basic principles of personal and equipment hygiene must be followed at all times to minimise the risk of exposure to disease agents and minimise the risk of spreading disease.

A zoonotic disease is a disease that is transmissible from animals to humans. It is important to remember that we can also transfer diseases to fauna that we care for. Wildlife rehabilitators should be constantly aware of the potential for disease transmission and use appropriate protective wear, e.g. gloves, eye protection, masks, overalls. Appropriate techniques when handling wildlife must also be used.

Some of the main zoonotic diseases to be aware of:

- Reptiles – Salmonella, Mycobacterium and Cryptosporidium
- Birds – Salmonella, Psittacosis (*Chlamydia psittaci*) and Mycobacterium
- Mammals – Salmonella, Ringworm, Sarcoptic mange, Q fever, Toxoplasmosis. Toxoplasmosis is a concern if there is direct contact with cat faeces.

Also, handling raw meat, including post mortems of native mammals is considered a route of transmission and disposable gloves must be worn.

Bat viruses include Lyssavirus, Menangle and Hendra virus.

Specific outbreaks of a disease that are transferable to humans should be reported immediately to your doctor (to establish if the Health Department must be notified), the local veterinary practice (to establish if the Department of Agriculture should be notified) and Parks and Wildlife. Strict quarantine and hygiene protocols should be observed in the case of such outbreaks.

All rehabilitators are advised to acquire all necessary vaccinations e.g. Tetanus. When handling bats in the rehabilitation process, rehabilitators must have pre-exposure rabies vaccination for Lyssavirus. Rehabilitators who become pregnant are advised to consult with their doctor for additional information on safety during pregnancy. It is recommended that any person involved in rehabilitation of bats be 16 years or over.

The presenter of any fauna to a rehabilitator should be questioned regarding the possibility of any contact with the animal, such as bites or scratches. If injured, the individual should immediately be referred to his/her own doctor for medical attention.

If the bite or injury is from a suspect bat, the animal should be presented to a veterinarian. The veterinarian is responsible for reporting the incident to the State Veterinary Officer who then determines the fate of the bat as per the AUSTVETPLAN. Euthanasia and subsequent testing for Australian Bat Lyssavirus will be carried out.

If at any time a rehabilitator suffers an illness for which a diagnosis has been difficult or treatment not effective, the following advice should be provided to your medical practitioner:

“This person works with sick, injured and orphaned native fauna and may be subject to exposure of zoonotic agents. Zoonotic diseases are caused either by apparently new agents or by previously known microorganisms, appearing in places or in species in which the disease was previously unknown. In considering a diagnosis, especially in cases of generalised symptoms or where diagnosis becomes difficult, the possibility of one of these agents being involved should be considered.”

Human health responsibilities

Domestic animals should not be allowed at a rehabilitation facility. If this is unavoidable, domestic animals must not have direct contact with, or direct exposure to, wildlife that is being rehabilitated and/or conditioned for release.

A program for rodent and insect control is recommended for wildlife care facilities. However, if pesticides are used, care should be taken to avoid contaminating either human and animal food or animal housing areas with pesticides. If rodenticides must be used, non-warfarin based products are recommended.

Smoking should not be permitted on any wildlife rehabilitation centre premises.

Minimum standards for the control of diseases transmissible from fauna to humans

- Maintain a high level of personal hygiene, including thorough washing of hands before and after handling fauna and before eating. Lavatory facilities should be accessible with hand-washing sinks and suitable washing agents.
- Clothing should be clean and changed as often as necessary. It is suggested that the facility provide protective clothing to volunteers and where possible, launder them on-site.
- Shoes and boots should be closed-in and kept clean of faecal matter, dirt and cage litter.
- Disposable gloves and surgical masks must be available for use if requested and for cleaning contaminated animal quarters.
- Eating and drinking should be restricted to designated areas situated away from fauna treatment and animal food preparation areas and from all animal waste materials.
- All supervisory staff must be given basic information on zoonoses. Personal hygiene rules should be established and the supervisory staff should set an example.
- Animal food must be packaged separately from human food at all times. The storage of animal carcasses (if being kept for samples) must be kept in separate refrigeration/freezer facilities from those used for human food.
- If separate refrigeration/freezer facilities are not available, carcasses must be double bagged in heavy duty plastic.
- Wildlife rehabilitators should keep up-to-date with information about any specific diseases that may be encountered when working with wildlife.

Minimum standards for the control of diseases transmissible between fauna

- Cages should be cleaned of waste, faeces or uneaten food daily and disinfected at the end of use and a spelling period (keeping the enclosure empty) and exposed to sunlight is highly recommended.
- Hands must be washed in between handling fauna that are not housed together.
- Cages should be designed for efficient cleaning. When possible, seamless, nonporous materials (such as stainless steel, fibreglass or plastics) should be used for cage construction and food containers.
- Dedicated cleaning tools must be used for each aviary or holding cage/box if a contagious disease is suspected or confirmed.
- Animal enclosures should be kept in a hygienic condition by having an adequate and routine cleaning regime in which responsibilities are clearly defined and assigned to volunteers.
- Fauna confirmed or suspected of having a contagious disease must be kept isolated from all non-infected, susceptible fauna. Isolation may be as simple as a separate hotbox or a cage/enclosure set away from all others; however a sealed environment/cage is a more effective option.
- Dedicated tools must be set aside for isolation enclosures/cages and quarantine measures put into place.
- Newly acquired fauna should be housed separately from in-house fauna upon arrival at the centre and should be kept in quarantine for a sufficient period of time to allow the rehabilitator to establish whether any disease risk exists.
- Fauna that are presented together (litter mates or nest mates) may be housed together during this period. They should not be added to a group pen or enclosure until it has been established that they are in good health.

CHAPTER 4 – DISEASE CONTROL

Proper disease control is a serious concern for rehabilitators and permit-granting agencies. As a basic principle, personal and equipment hygiene must be followed at all times to minimise the risk of exposure to disease agents and minimise the risk of spreading disease. Upon arrival, all fauna should be isolated in a separate area (quarantine) until their health status can be determined. This can be as simple as an isolated hotbox or cage positioned away from other animals.

Sick fauna should be maintained in quarantine throughout the period of their rehabilitation. It is recommended that fauna of different species are kept separate.

Facility hygiene is an integral part of disease prevention and containment. Proper cleaning agents combined with a sensible, regular cleaning schedule will reduce the spread of disease within a facility. Cleaning protocols may vary considerably based on the species and condition of fauna in care, facility type, and cage construction.

Choice of cleaning agents must be made with these variables in mind. The timing of cleaning efforts is another important feature of effective disease prevention. Suggestions for proper and regular cleaning maintenance will help rehabilitators prevent disease within their facility.

It is beyond the scope of these *Standards* to note all available options for detergents and disinfectants on the market. What is most important to consider is implementing an effective minimum standard cleaning regime with special consideration given to any changes if a particular disease outbreak occurs and the management of the situation at this time, as some disinfectants work better against specific disease entities than others.

Consult a local veterinary practice for current information on new products available and their effectiveness for your situation.

Standards to prevent disease transmission within the facility

Minimum standards required:

Regular cleaning and disinfecting with hospital-grade disinfectant and drying in sunlight (UV radiation) should be applied to all furniture, equipment and enclosures. The act of physically cleaning with hot water and detergent is the most effective method of removing most (but not all) of the biological containments and agents that can transmit disease. The use of a disinfectant is an essential follow-up step to cleaning and will kill most (but not all) of the remaining biological agents of a disease.

Detergents are cleaning compounds and include both soaps and synthetic detergents. While soaps are non-antibacterial, the physical scrubbing action of cleaning removes many of the microorganisms. Detergents (dish detergents

and laundry detergents) alone, do have minor disinfectant action against vegetative bacteria, however, they are not effective against fungi or viruses. Additionally, they lose their disinfecting effectiveness in the presence of blood or tissue debris.

Disinfectants destroy microbial organisms or decrease the rate of their activity. Selection of a disinfectant for use in the facility should be based on its spectrum of activity. A disinfectant that will be effective against bacteria, fungi and viruses, with low toxicity and good biodegradability, is ideal. Ensure that all disinfectant residue is rinsed from all equipment after the appropriate contact time. Chlorine (bleach) is an effective and inexpensive disinfectant for general everyday use.

The disadvantages of using bleach include: the spectrum of activity is not as broad as other disinfectants; its lack of efficacy when organic matter is present (e.g. if surfaces have not properly cleaned in the first instance, the disinfecting process will be much less effective); and bleach is highly corrosive and breaks down in light.

Other suggested disinfectants include, Essential Chemicals F10 ®XD or SC, Virkon® or Viraclean®. These broad-spectrum activity disinfectants can be used for most situations but also lose some of their effectiveness when organic matter is present and are more expensive than chlorine.

Drying and sunlight: drying and exposure to sunlight (UV radiation) will kill most but not all bacteria (e.g. hanging hessian bags in the sun). Bacteria flourish in warm, moist environments.

Thorough drying of enclosures and equipment is an important requirement to ensure proper and effective disinfecting.

CHAPTER 5 – RELEASE CONSIDERATIONS

Successful release of a rehabilitated animal is predicated on an understanding of biological and non-biological factors. These include medical and physical readiness and life-stage of the animal, release strategy and the availability of suitable habitat.

Establishing and following minimum standards for release conditioning will aid in the initial decisions for treatment, husbandry care protocols and evaluation of readiness for release. For all wild fauna undergoing rehabilitation, the following criteria must be met prior to release.

Serious consideration should be given to the likelihood of being able to meet the following minimum release standards, before instigating a course of long-term treatment and rehabilitation. Euthanasia should always be considered as the preferred option, if it is unlikely that the animal cannot be fully rehabilitated, or if the rehabilitation will involve significant levels of stress and/or pain for the animal in long-term and intensive treatment/rehabilitation programs.

Before an animal is considered for placement in long-term captivity (for education or captive breeding), its suitability and adaptability to captivity should be assessed. In many cases, an adult wild animal is likely to suffer significant physical and psychological stress in captivity and would be an inappropriate candidate for this purpose.

Contact the local Parks and Wildlife office for appropriate advice at time of release.

Standards for release

Minimum standards for release candidates include:

- The fauna must demonstrate full recovery from the original sickness or injury or from treatment incurred while in care
- The fauna must not be in need of further medical care
- The fauna must not exhibit any signs of active disease
- The fauna must demonstrate an appropriate level of physical fitness
- The fauna must possess adequate vision to find/catch food, avoid predators and have full physical function
- The fauna must exhibit locomotive skills necessary for that species to survive and navigate in a complex environment
- The fauna must demonstrate an appropriate fight or flight behavioural response
- The fauna must demonstrate proper foraging behaviour (ability to recognise, source and harvest food)
- The fauna must demonstrate normal species behaviour (e.g. not improperly imprinted, appropriate nest construction, ability to define territory etc)

- The fauna must be of sufficiently mature age for independent survival. In the case of foster care, it must be positioned within an appropriate social group
- The fauna must be in the correct weight range for that sex, species, age and season of the year
- The fauna must possess pelage, scales, skin or plumage that is adequate for that species to survive in the wild
- The fauna must have a sufficiently waterproof pelage/plumage relevant to that species to enable it to survive in its natural environment

Where to release

The primary concern when selecting a release site is the impact the release will have on the existing wild population and the natural environment.

Rehabilitated fauna must, where possible, be released back into the area where the animal originated from, provided that location is within the animal's normal home range and where such fauna is ordinarily found in the wild. This practice minimises the unnatural spread of parasites, diseases and genetic material among wild populations and maximises the animal's chance of survival.

If information regarding the location where the animal originates from is not available, or the site is no longer suitable due to habitat loss or other reasons, an alternative suitable site must be selected. Selection must comply with Regulation 28A of the Wildlife Conservation Regulations 1970, as set by the department and should meet all habitat requirements of the animal. The rehabilitator must contact Parks and Wildlife for current information on suitable release sites.

A rehabilitated or hand-raised animal must be released at the original site of capture unless the environment is unsuitable.

An unsuitable environment is one that:

- lacks appropriate habitat or has inadequate shelter and food resources
- is too small to accommodate the animal's natural ranging patterns and movement (e.g. many areas of remnant bushland are too small for kangaroos)
- is overcrowded with conspecifics, or
- places the animal at a high risk of being injured (e.g. near major roads, development or domestic animals).

If the environment at the site of capture is unsuitable, the rehabilitated or hand-raised animal must either be euthanased or released in a suitable environment within the locality of the original capture without transporting it across a geographic or physical barrier that it would not normally cross.

Locality is defined as:

- State waters within three nautical miles of the Western Australian coastal waters for seabirds and coastal marine mammals and tropical or sub-tropical waters for marine turtles (pelagic species may be released further offshore)
- Within 100km of the site of capture for mobile terrestrial species such as large kangaroos and flying-foxes
- At the site of capture, or if this is not possible, within the same catchment for all other mammals, birds and reptiles
- Within the property of the site of capture for site-faithful mammals e.g. western ringtail and brush-tail possums.

Amphibians must only be released at their original encounter site to reduce the risk of transmitting infectious diseases to wild populations (e.g. Chytrid fungus).

Pythons cannot be released unless confirmed no contact has been made with captive pythons (due to the risk of transmitting Inclusion Body Disease).

In some circumstances juvenile fauna, especially those that were brought into rehabilitation as infants, may not be able to be released at the site of their capture. Release sites should be selected based on the same criteria as noted above.

Parks and Wildlife must be notified of any pending release of a Specially Protected Fauna. Contact local Parks and Wildlife offices for advice and information prior to release.

When to release

Consideration must be given to the species, its natural biology and the most appropriate time to release.

As a minimum standard, the following must be considered:

- Is it nocturnal? Release early evening, to allow maximum number of night time hours to become familiar with the local surrounds and locate appropriate daytime refuge sites.
- Is it diurnal? Release at dawn to provide maximum number of daytime hours to become familiar with the local surrounds and locate appropriate night time refuge sites.
- Is it migratory? If so, where should it be released?
- Is the current and forecasted weather, e.g. drought conditions, cold snaps or thunderstorms, going to have an impact on its survival?
- Is food available at the release site?

It is always recommended that you contact your local Parks and Wildlife office for advice at the time of release.

Soft and hard release considerations

Consideration must be given to the selection of release technique employed for a group and/or individual.

Minimum standards:

In general, young altricial (dependant) fauna will benefit from a soft release (with supplementary food provided), while adults and young precocial (non-dependant) fauna are often best served with a hard release (no supplementary food).

Mammals

- Hand-reared marsupials are better suited to a soft release program.
- Hand-reared marsupials being released into Parks and Wildlife monitoring transects (that is, an established predator-proof environment with ongoing scientific monitoring) may have a hard release if determined appropriate by Parks and Wildlife staff.
- Adult mammals that have been in captivity for a short period of time due to injury or illness and are being returned to the original encounter site are suited to a hard release.
- Adult mammals that have been in care for an extended period must be assessed to determine whether the animal has all the necessary skills to cope with a hard release (that is, it has the ability to re-establish a territory).
- Hand-reared bats that have been socialised and conditioned to find their own food and can fly with complete accuracy can be hard released at a site where other bats are known to roost.

Birds

- Hand-reared birds that have been conditioned effectively during fledging and weaning can be soft released in a group. An assessment of the birds close to the release time must be made to determine their suitability for the type of release for which they are best suited.
- Adult birds that have been in captivity for a short period of time due to injury or illness and are being returned to the original encounter site can be hard released as quickly as possible.
- All birds must be able to waterproof themselves before being released.
- Species that recognise each other as the same may benefit from being released in a group to aid in picking up behavioural cues from others in the group.
- Certain raptor species need to be flown prior to release so hard or soft releases may not be appropriate.

Reptiles

- Rarely require a soft release and can be moved through Stage 2 (refer to Chapter 6) quite quickly and then released at the original encounter site if appropriate.
- The exception to this may be those that are born in captivity by default and then released.
- Experience demonstrates that Shingleback lizards that are born in captivity must be over 150gms in bodyweight before being released. Where possible, they must be released in the mother's home range.
- If a winter release is necessary, reptiles need to be fasted and only released when the gut is empty of food (several days of no stool after an appropriate amount of stool is passed following the last feed).

Amphibians

- Amphibians must only be released at their original encounter site to reduce the risk of transmitting infectious diseases to wild populations (e.g. Chytrid fungus).
- If the origin is unknown, contact local Parks and Wildlife office to seek advice from a Wildlife Officer.

In all cases of release the rehabilitator must comply with the conditions listed as a minimum standard for attempting a release.

Selection of release site

The following factors are to be considered when selecting a release site:

- Suitability of habitat for the species
- Adequacy of food supply and long-term food sources
- Proximity of busy roadways
- Absence of natural or introduced predators (e.g. domestic cats), human developments
- Absence of dangerous/toxic species of plants
- Whether there are any current or pending damage licences issued or about to be issued for that area which may impact upon the rehabilitated fauna
- The presence of existing populations of that species, free from known disease. Consideration must be given to the density of conspecifics (like species) at the proposed release site and whether there is likely to be vacant territory available for the released animal to occupy without excess aggressive interactions with resident fauna
- The presence of domestic animals at the immediate release site (must not be present).

Releases must occur within the parameters of local and State regulations and within the natural range of the species. Contact your local Parks and Wildlife office for latest relevant information before release.

Minimum standards for transportation of fauna

Fauna must be transported in an appropriate secure carrier. The process of transporting must be as stress-free as possible.

- Carrier size and construction must be appropriate to avoid any injury and undue stress to the animal in transport
- Appropriate carrier size to allow the animal to stand but not necessarily turn around
- Adequate padding on the transport carrier to avoid injury e.g. lining wire doors with shade cloth
- Minimise noise around the animal
- Minimise light and visual stimuli around the animal
- Appropriate ventilation and climate control must be effective during transportation
- Appropriate food and water must be available if the journey is extended
- An appropriate rigid crate that complies with International Animal Transport Authority (IATA) Regulations must be used in the event that the animal is being flown to a release site
- Fauna must not be transported in the boot of a car
- Domestic pets must not be transported with wildlife
- Birds being transported in a carrier, must be provided with adequate and appropriate perching to avoid tail damage
- Where appropriate, some raptor species may need to be transported with a tail sheath
- Fauna being transported in a carrier must be kept in a smoke free and chemical free environment.

CHAPTER 6 – HOUSING REQUIREMENTS BASED ON STAGES OF CARE

Appropriate cage space is conditional to the species, the behaviour of the individual, the nature of the injury and the specifics of treatment and recovery. Recommended cage dimensions are based on approximations of space requirements during three recovery periods, each defined by the activity level required of the fauna.

These are:

- **Stage 1** – Intensive Care (sick/injured/hand-rearing)
- **Stage 2** – Acclimatisation
- **Stage 3** – Pre-release

The following paragraphs describe the three stages and the housing best suited to the stage. Indoor caging is replaced by outdoor caging as the animal progresses through the rehabilitation process. Fauna requiring large expanses of water (e.g. grebes, pelicans, pelagic birds, and many marine animals) present some challenges to wildlife rehabilitators and this staged approach may not apply directly to such species.

During the process of recovering from an injury or illness and the rehabilitation period, fauna should not be moved from rehabilitator to rehabilitator unless it is essential and in the best interest of the animal. This type of disruption may lead to stress-related illness and possible separation anxiety. This is particularly important when dealing with hand-reared mammals.

Stage 1 – Intensive Care

Intensive Care (IC) has two main purposes: to restrict activity and to maximise environmental support by provision of medication, heat, humidity and supplementary nutrition. IC is maintained primarily indoors. An animal that is sick/injured or is in the very early stages of recovery will have its movements restricted but will be provided with enough room to maintain a normal alert/upright posture and to stretch its body, limbs and tail, but not enough to leap, fly or run. Conditions requiring restricted activity include re-hydration, hypothermia, fractured bones and wound care. Any animal with severely debilitating conditions such as shock, toxicity, neurological impairment or other conditions that require close supervision and management should be considered for IC. Fly-proof enclosures are essential to prevent fly strike of wounds.

The holding area should be small enough to facilitate easy observation and capture, thereby minimising capture stress and the possibility of injury during repeated periods of capture and treatment. Fauna confined to their pouch/nest prior to weaning and fledging are included in this category.

Restricted activity areas are provided by housing in hotboxes, pet packs, veterinary cages and other small enclosures. Refer to Parks and Wildlife's *Basic Wildlife Rehabilitators' Course Manual* for more comprehensive information on

options for IC housing. Perches close to the cage floor (relative to the size of the bird) and/or walk-ups to perches should be provided to avoid further injury or damage to tail feathers. Padded perches or substrate should be provided to minimise bumblefoot in raptors and waterbirds. Where available, Perspex hotbox fronts should be provided for owls, raptors and high-stress birds to prevent beak and feather damage. Hiding areas, such as boxes/pouches or towels, must be provided for those species with more reclusive behaviour such as snakes and marsupials.

Stage 2 – Acclimatisation

Acclimatisation and physical therapy comprise the next phase of the rehabilitation process during which the animals are recovering from illness or injury. In the case of orphaned fauna, Stage 2 involves the process of weaning/fledging and can involve a combination of both indoors and outdoors housing.

Movement is now encouraged to build up strength and to provide gentle physiotherapy where needed. This physical therapy may be voluntary or enforced by the rehabilitator. Periodic capture and medical treatment may still be necessary and the animal must be in an appropriately sized holding area to facilitate this. Similar enclosures should also be used for fledged birds and mammals in the process of weaning.

Macropod 'joey yards' may fall into this category, with a setup being as simple as a verandah or small section of garden with *ad lib* access to hanging pouches and/or a secure enclosure. Outdoor caging should provide the opportunity for short flights or walks/runs. Perches and walk-ups to perches (birds) or hiding areas and nest boxes (all fauna) should be provided. Semi-aquatic and pelagic species should be exercised under supervision in tubs or pools of water provided for that purpose.

Housing for reptiles must contain hygienic, absorbent substrate and a shelter that facilitates natural hiding behaviour. Reptiles that naturally bask must be provided with lighting appropriate to the species' needs (e.g. UV light). Arboreal (tree-dwelling) reptiles must be given climbing opportunities and aquatic reptiles (e.g. turtles) must be given swimming opportunities.

Stage 3 – Pre-release

Unlimited activity using large outdoor aviaries/enclosures is essential in this stage. This environment provides physical and psychological experiences and conditioning or reconditioning through extended flights for birds and walking, running and/or climbing for reptiles/mammals. This housing should allow fauna to improve their strength, develop stamina and coordination, restore muscle tone, and continue to acclimatise to current weather conditions and other elemental stimuli such as wind, noise and the general environment.

Physical therapy should be initiated by the fauna, although additional exercising may be provided by caregivers if considered necessary. Pre-release aviaries/enclosures should be used to prepare fledged birds and weaned

mammals for release. There are often one or two additional stages factored into Stage 3 for hand-reared macropods.

Reptile and amphibian species are often an exception to requiring a staged rehabilitation process.

Most lizards, snakes and tortoises can move from Stage 2 directly to release. The larger varanid species may require a Stage 3 pre-release period in their rehabilitation to ensure fitness on release.

Certain raptor species will require free-flying prior to release to build up strength and conditioning.

Nutritional acclimatisation

As the fauna progresses through Stage 1 and moves into Stage 2, its nutritional needs must be considered and a plan put into place. An early move to a natural diet is essential in many species due to the possibility of unknown nutritional deficiencies in captive diets and the unavailability of many captive diet food items in the wild.

All fauna should be fed a nutritionally balanced, palatable diet in a form and presentation that they will recognise and be exposed to once released. Nutritional balance is essential for all fauna and is particularly critical in the case of fast growing young fauna. Parks and Wildlife does not condone the feeding of live prey, other than insects and fish, during rehabilitation.

Nutritional needs in the case of preparing for soft releases:

- Consider whether to provide a standard bowl of food close to a release hatch or the aviary door
- In preparation for when the hatch/door is open and the fauna can return for the food
- Consider changing the presentation of the food by allowing it to be scattered in the aviary/enclosure rather than providing it in a bowl
- If released fauna is still returning and eating all food provided, after eight weeks post-release, a review of the release must be completed and a plan implemented
- Wean fauna off the supplemented food slowly and systematically.

Nutritional needs in the case of preparing for hard release:

- Does the animal recognise and eat natural food?
- Is it on a wild diet prior to release?
- Can it forage and catch its own food locally?
- Is it maintaining weight on a wild diet?

Food intake must be monitored regularly during Stage 2 and Stage 3. As a minimum requirement during Stage 2, body weight must be taken every two weeks. When the opportunity presents, body weights can be taken more frequently. Body condition scoring may be a substitute in cases of larger fauna.

Weighing the animal during Stage 3 is not recommended due to the additional handling this involves, however if there are concerns about the animal's food intake and body condition, its weight must be obtained and body condition assessed. A plan to improve the status of the animal can be set from here. Release weights (where achievable and appropriate) and/or comments on body condition should be documented in the records maintained in respect of that animal.

Environmental acclimatisation

To minimise unnecessary stress, fauna must be taken through a process of environmental acclimatisation at each stage of their rehabilitation.

Stage 1 to Stage 2

- Reduce the amount of supplementary heat being provided. This can be reduced over one or two days by turning the thermostat/dimmer down or reducing the wattage of the heat source. The aim is to reach the point where the animal is still in its IC environment but is not receiving supplementary heat.
- Reptiles may require a thermal gradient.

Stage 2

- Move the fauna to an ambient temperature environment. This can involve keeping the fauna inside during the evening and exposing it to periods outside during the daytime.
- Progress to the fauna remaining outside all the time but still being held in a smaller holding cage, protected from inclement weather.
- Supplementary heat may be provided at night and on days when the weather is unseasonably cold.
- Provide the fauna with more space.
- Provide the fauna with basic structures in the environment to meet its needs, e.g. perches, climbing structure.
- Facilitate the waterproofing of plumage of avian fauna by providing access to water baths and/or dust baths for preening purposes.
- Reptiles may, in many cases, move from Stage 2 to immediate release. Large varanids may be an exception to this, particularly where developing a level of fitness is essential prior to release. These monitors will benefit from being placed into a pre-release environment.

Stage 3

- Supplementary heating is discontinued.
- The fauna is kept outside all the time with access to inclement weather and protection.
- The fauna is provided with a larger environment to enable it to develop its fitness.
- Human interaction should be avoided unless absolutely necessary.

CHAPTER 7 – BASIC REQUIREMENTS FOR HOUSING DURING REHABILITATION

The natural biology and behaviour of any species must be considered in the enclosure design process. Not only does the enclosure provide for security from escapes and protection from outside interferences and predators, it provides habitat in which the animal can learn or relearn behaviours specific to that species.

Caging should provide fauna undergoing rehabilitation with the opportunities necessary for complete recovery from injuries and/or for learning and practising vital behaviours such as foraging or hunting. Cage design and furniture should address and encourage species-specific patterns of foraging, play, rest or sleep, hiding or predator avoidance and social responses to conspecifics or cage mates, including reproductive behaviour. Minimum standards for appropriate habitat furnishing can be found in the specific housing sections that follow.

Wildlife rehabilitators should be able to provide enclosures or cages of appropriate size made from appropriate materials that contain appropriate furnishings for all ages of all species that they commonly care for. The cage/enclosure/aviary sizes recommended in the standards are minimal, and the suggested materials work well for many rehabilitators. Alternative techniques for housing and pre-release conditioning are encouraged, but must meet basic natural biology, comfort, husbandry and hygiene requirements.

Assigning cage size strictly by species is not always realistic as variations in an individual's size, and variations in an individual's behaviour due to age and season, will affect appropriate cage size. Dimensions can be modified to accommodate special needs of the facility, the individual animal or new advancements in the field.

Minimum standards for enclosures are based on good judgement and sound practical sense. All enclosures must be structurally sound, constructed of materials appropriate for the species housed, be maintained in good repair, and designed to protect the animal from injury, abuse, or harassment, while containing the animal and restricting the entrance of other fauna.

Enclosures must provide sufficient shelter from overheating, excessive rain and cold temperatures. Each animal must be able to turn about freely, and lie or sit comfortably, unless medically restrained. The construction material must be of sufficient strength and where practicable, be of a nonporous, waterproof finish to facilitate effective cleaning and disinfection.

The facility or home setup should have reliable and adequate water and electricity. Food and bedding must be stored in an appropriate manner that protects it from spoilage, infestation by parasites and contamination. Waste must be properly disposed of in accordance with all regulations, in a manner that minimises vermin infestation, odours, and disease hazards. The facility must provide fresh air in a manner that avoids drafts, odours, water

condensation, and provides auxiliary ventilation. Lighting must be adequate to allow for inspection and cleaning, while not stressing the fauna. The facility must be sufficiently drained to protect against sewage back-up and to rapidly eliminate water accumulation.

Many indoor and outdoor cages can be constructed for multi-species use. These cages can be quickly modified to accommodate different species through substituting different perches or other furnishings. A separate cage is not needed for each species the rehabilitator intends to treat, but cages should be able to be adequately cleaned and disinfected and adapted to meet the minimum standards required for the species.

The young of many species of fauna, e.g. fledgling magpies, black cockatoos and juvenile kangaroos, must be group-housed with like-species to avoid imprinting and/or socialisation with humans. Efforts must be made to network with other rehabilitators to place individual (single) young fauna with others of their own species and to place large species that require an extensive area for rehabilitation in an environment conducive to their recovery.

General indoor housing

Indoor holding is generally applicable when an animal is in Stage 1 of the rehabilitation process and is sick/injured or is being hand-reared. This is a critical time for the animal and stress must be reduced as much as possible.

Minimum standards include:

- Location in an area that provides minimal visual and auditory stimuli.
- Provision of visual barriers, positioning cage fronts away from human activity, and placing the enclosures as far from noise and high traffic areas as is practicable.
- Fauna should be exposed to natural daylight where possible, subject to species-specific requirements. Full-spectrum, UVB, UVA and visible lighting should be used when natural lighting is not possible. Any artificial light source should be timed to mimic current seasonal daylight cycles.
- Nocturnal fauna should be covered by day and left uncovered by night

General outdoor housing

Fauna undergoing rehabilitation must be housed in secure outdoor enclosures prior to release to allow for adjustments to climate and external natural stimuli. Large, outdoor enclosures provide opportunities for exercise, behavioural rehabilitation, and climate adjustments, while smaller outdoor caging may be used for Stage 2 acclimatising.

The selection of minimum cage sizes is determined by the fauna's ability to make a full recovery.

Note: None of the Stage 1 or Stage 2 sizes are recommended for extended or permanent care (with the exception of reptiles). Housing for fauna kept permanently (e.g. for educational, exhibit or captive-breeding purposes) is not addressed in this document. Refer to the Wildlife Conservation Regulations 1970, Section 31, *Code of Practice for Exhibited Animals and Birds in Western Australia* and *General Standards for Exhibiting Animals and Birds in NSW*. A link for this document can be found in the reference section.

The information available on appropriate aviary/enclosure sizes for all captive wildlife species is limited, however Parks and Wildlife recommends that where practicable rehabilitators adopt as a minimum standard, the Stage 3 pre-release sizes (as noted in this document) for housing fauna used for education and breeding purposes.

Special consideration must be made in the design of outdoor enclosures to provide adequate and proper shelter, safety, and habitat for all fauna in rehabilitation. Enclosures should be made secure against rodents and potential predators, including adequate perimeter control. For example, a cement floor and foundation with suitable mesh and cover.

For more detailed information, refer to the 'Housing requirements' described in the following pages for the various groups of fauna. Enclosures and their contents should duplicate natural conditions wherever practical.

Design of enclosures should provide for ease of cleaning, proper ventilation, adequate light and temperature control. Proper substrates and furnishings appropriate for each species should also be provided in each enclosure.

Fresh water for drinking and/or bathing must be available in each enclosure.

Each outdoor enclosure must possess an area that provides necessary protection from the elements, yet still enables the animal to be conditioned for survival in the wild. Similarly, all outdoor cages should be partially roofed to provide shelter from inclement weather and a dry area where food can be placed without being spoiled by the elements.

Outdoor enclosures ideally protect the animal without habituating it to human activity. To avoid habituation to humans and/or imprinting, enclosures should be surrounded by a fence or placed out of view. As in the design of indoor housing, minimal human contact, both visual and auditory, is essential.

Domestic animals and other potential predators must be prevented from contacting fauna in rehabilitation as predator avoidance is an important factor in survival of rehabilitated fauna.

Consideration of these variables when designing outdoor enclosures is vital for proper rehabilitation of wildlife.

Outdoor housing alone may not be adequate for full conditioning of certain species or providing a suitable environment for full recovery from certain injuries. For example, the fitness-conditioning requirement for successful release of a pelican recovering from a leg fracture may exceed that provided by

most rehabilitators. The large cages or deep pools necessary for proper conditioning of some species are not available to all wildlife rehabilitators.

In many instances, cooperation with other rehabilitators or wildlife professionals may ultimately be the most successful strategy available to individual rehabilitators.

Transferring fauna to other rehabilitators with more appropriate caging is essential.

The successful release and continued survival of rehabilitated fauna should be the goal of all rehabilitators and networking to share information, skills and equipment is vital to the success of rehabilitation efforts and to achieving the best outcome for the fauna.

CHAPTER 8 – AVIAN HOUSING REQUIREMENTS

Cage sizes specified are the minimum and have been calculated on the basis of various species at different stages of rehabilitation.

Rehabilitators need to be aware that some avian fauna species may have different height and ground area requirements than others of a similar size. For example, while pheasants and egrets are the same size, one requires ground space while the other needs height. It is therefore important that rehabilitators are able to recognise these differing requirements and if needed, substitute standard size cages with larger or differently shaped cages to meet the individual species' requirements.

Multiple occupancy of cages by several members of the same species is not only acceptable but is often beneficial, particularly in acclimatisation of fledgling birds.

Occasionally, it may be necessary to house more than one species together. In these circumstances, to avoid aggression between species consideration should be given to selecting birds of similar size and lifestyle.

For example, diurnal birds should be housed with other diurnal birds and social or gregarious birds housed with social birds. Individuals of certain species, such as herons and egrets may be extremely aggressive and may require separate housing.

How many birds in an aviary?

It is very difficult to provide minimum standards for the maximum number of birds that can be safely housed in an aviary. Observation of the birds in the wild will often give the best indication of what to be aware of when trying to gauge the concentration of birds in a confined space.

If you are housing a species that forms groups, the average number of birds in a group in the wild may provide a guide as to an acceptable number of individuals per cage for that species. If the birds are not a flocking species, then the number that can be safely accommodated in an aviary will usually be far fewer.

Observation for signs of overcrowding is essential.

General avian furnishings

Many types of cage furnishings are appropriate for birds undergoing rehabilitation.

- Perches must be customised to the appropriate size, material and height (tail must clear the floor of enclosure) for the species using them. Perch diameter should be of an appropriate size and type to suit the natural

biology of the species (e.g. limb-perchers versus ledge-perchers) and should be designed with the goal of minimising foot damage

- Perching sizes are relevant to the ability of the longest toes to curl one third of the way around the perch
- Bowls or pools for bathing should be provided for all birds whose medical condition and immaturity does not prohibit them from getting wet
- When perching is required, each cage should have a minimum of two perches (excluding Stage 1 housing) for birds capable of perching
- Perches must not be positioned directly over each other or over food or water containers
- Perspex hotbox fronts are required for nocturnal and high-stress birds to prevent beak and feather damage
- Outdoor caging must contain some sort of nest box for cavity nesters or a sheltered area for other birds. Nest boxes and shelters provide a natural space that reduces stress and enhances security
- Access should also be provided to normal, natural weather variants such as sun, rain and wind etc

Construction materials

Many different types of construction materials are used for avian rehabilitation enclosures. Selection of appropriate material is an important consideration when constructing enclosures.

- Aviaries must have a double-door entry system for housing birds that can fly in confined areas.
- Aviaries may have a single-door entry system for housing birds that do not fly, or are restricted from flying in confined areas.
- Aviaries must be lockable.
- Aviaries must be rodent and predator proof.
- Building materials used in the construction of aviaries must be sturdy and durable.
- Solid walls of aviaries should be constructed of Zincalume, weathered galvanised materials or other weatherproof materials.
- A minimum of one third of the area of the aviary must be protected from the elements. This can be achieved by using solid materials to provide cover and security. Screening with natural foliage (i.e. planting trees or shrubs around the outside of the aviary) can assist in providing cover and security.
- The surfaces all materials used in the construction of aviaries must be non-toxic, including any paint applied to construction materials. The use of chemically treated woods and metals is not recommended, particularly in the construction of cages or aviaries for “chewing birds” such as parrots and cockatoos.

Flooring considerations

Flooring or substrate for aviaries varies depending upon the types of birds being housed.

- For perching birds, a concrete base is adequate.
- For ground birds, substrates such as sand are appropriate and must be cleaned daily.
- Some organic materials such as sawdust, straw, wood shavings and other similar materials can carry fungal pathogens such as aspergillus and should be used with caution. Raptors and waterbirds are particularly susceptible to these pathogens.
- Natural (bare earth) flooring is ideal in very large enclosures. This must be cleaned at least once daily and depending on the number and size of birds housed in the enclosure should be turned over on a regular basis to allow aeration and exposure to sun.
- Suitable substrates for small holding cages include newspaper, non-fraying cloth material and paper towels. The selection of substrate is dependent on the species being housed.

Housing for songbirds

The songbird (passerine or perching) group of birds includes a large number of individual species with wide ranges in size, behaviour, habitat, foraging techniques, food items, and subsequent rehabilitation requirements. These requirements must be understood and addressed to ensure successful rehabilitation and eventual release of healthy, well-adapted individuals that are adequately prepared for survival in the wild.

Understanding the natural biology of any species in rehabilitation is necessary when considering caging arrangements. Songbirds have many natural predators such as other birds, snakes, small mammals and domestic animals such as cats and dogs. Care should be taken to reduce exposure of these birds to potential predators but not to the detriment of their predator awareness, thereby reducing stress and/or potential injury.

The caging requirements for pre-release conditioning can vary greatly among songbird species. The rehabilitator must understand the natural biology of the species and consider the bird's needs during rehabilitation and pre-release conditioning.

As an example, some species generally fly straight from their nests, requiring very little pre-fledge training, while others leave the nest early and spend a lot of time on the ground while developing flight feathers. During this time, the fledglings follow the adults and learn appropriate survival behaviours. Larger songbirds require space to exercise and practice flying, so a larger aviary is recommended to house these species. A rule of thumb is that the length of an aviary is the distance a bird travels in four wing beats.

Construction materials

External wire on outdoor caging for songbirds should be made of galvanised mesh. The use of chicken wire or chain-link is not recommended, as the large openings allow predator entry or accidental escape of inhabitants if the interior lining becomes torn or loosened. Wire screening can be used successfully without causing damage to feathers. Raptor and owl enclosures should be lined with shade cloth.

Furnishings

Understanding the natural biology of the species, and then adapting the aviary accordingly for that species, will give birds a great advantage when released.

Cavity dwellers/nesters should be provided with some sort of hide box or cavity-type container. Aviaries that are furnished with natural plantings help reduce stress and provide the birds with natural shading, perching, hiding and foraging opportunities.

Table 2: Minimum standards for housing various avian species

Note: this table is not intended to be used independently but should be used only in conjunction with the information in Chapter 8: Avian Housing Requirements.

Species	Length of bird	Stage 1 WxLxH	Stage 2 WxLxH	Stage 3 WxLxH General considerations W = 3 x wing span L = 10 x wing beats	Mesh size and weight
Pigeons/doves Nightjars	25–35cm	32x20x32cm	57x45x45cm	2x2x2m	25x12.5mm
Honeyeaters Wagtails Wrens/finches Wattlebirds Tree martins Swallows	>22cm	32x20x32cm	57x45x45cm	2x3x2m	6.5mm ² 19–23g
Butcherbirds Mudlarks	<40cm	32x20x32cm	85x85x60cm	2x3x2m	25x12.5mm
Magpies Raven Currawong	>50cm	50x53x64cm	85x85x60cm	2x5x2m	25x12.5mm
Neophema Lorikeets	>22cm	32x32x32cm	85x85x60cm	2x3x2m	12.5mm ² 20g
Kingfishers Bee eaters	>28cm	32x32x32cm	85x85x60cm	2x5x2m	6.5mm ² 23g
Kookaburra Tawny Frogmouths	>50cm	55x53x64cm	85x85x60cm	2x6x2m	25x12.5mm
Larger parrots	>40cm	55x53x64cm	85x85x60cm	2x5x2m	1.6x1.25mm or 25x12.5mm
Cockatoos	>60cm	60x59x70cm	2x2x1m	5x6x2m	4x2.5mm 8- 12 g
Malleefowl Coucal Brush turkey	>60cm	42x67x48cm	2x2x1m (soft roof, or false ceiling)	5x15x4m (ensure roof material is soft bird netting and ensure plenty of natural cover and trees for high roosts)	25x25mm (line large enclosures with shade cloth for protection and visual barriers)

Housing for waterbirds

Waterbirds, as the name implies, are those birds that spend much of their time in, on or around the water. At Stage 3 (pre-release), all waterbirds will require a water pool in their outdoor caging. The size of the pool will vary from species to species. Any substrate used for waterbirds should be soft to minimise injury to feet e.g. sand.

When designing pools for water birds, the natural feeding, drinking and bathing behaviour of each species should be considered, along with the depth of water that best accommodate such behaviours.

Water quality must be considered when housing waterbirds. Birds are able to more easily preen and align their feathers in fresh soft water. Water softness of 2–3 grains or 30–50mg per litre of calcium carbonate is optimal. A higher concentration of minerals in hard water appears to interfere with waterproofing. It has been found that after birds have been in the above water for 24 hours and are waterproof, they may be moved to harder water or to salt water (C. Clumpner, 1990).

As a pelagic bird moves into the stages of pre-release, providing salt water in the pool can be considered. This is an expensive exercise, both in time and money. Alternatively, the bird's salt requirements can be met by providing salt tablets in its diet. It is essential that true pelagic birds are 100 per cent salt-tolerant prior to release however, most other aquatic species will tolerate the change from fresh water to salt water with less intensive acclimatisation.

The cage sizes recommended in this manual are minimums and may not be sufficient to accommodate for flight for all species, but should allow for a bird to flap its wings fully extended without coming into contact with the sides of the enclosure. Most birds will benefit from having as large an area as possible and the rehabilitator is encouraged to construct larger cages whenever reasonable. Large cages intended for fauna with greater space requirements can be designed in such a way that they can be subdivided or furnished for other species as required.

Construction materials

Construction materials for aquatic bird aviaries will differ to those for most other avian species.

Minimum standards

- All materials should be easy to clean and disinfect.
- Only materials that are impervious to water or that can be sealed to be made impervious should be used.
- Materials used for walls should provide visual barriers, minimise chances of injury, provide adequate ventilation and protect against predators and domestic animals.

- Suitable pool materials include plastics, fibreglass, rubber, cement and natural ponds.
- Pool design must allow for a graduated side and/or roughened surface to minimise damage to the bird's keel when exiting the pool.
- Any sharp or abrasive areas must be covered to prevent injury and substrates should be appropriate to prevent injuries to feet.

Most waterbirds spend the majority of their time in or near large bodies of water and are conditioned to seeing open sky overhead, the majority of the roof on an outdoor cage should be open, allowing for a clear view of the sky. Netting works well for this application and will prevent injury from collisions if the bird flies upwards. This type of construction is psychologically beneficial to the bird and it encourages them to exercise.

Many of these birds are colonial foragers and nesters. Group housing for colonial species of waterbirds may reduce stress while in captivity. A precise knowledge of the species' natural biology will help in determining if the birds in rehabilitation are too territorial for group housing and what the optimum number of individuals might be for various-sized enclosures.

Furnishings

Some factors in successful habitat construction are species-specific and include:

- Diving species require deep pools and may not enter a shallow pool such as a children's paddling pool.
- Rocks or short pilings for perches are required for some divers, but should never be used for small ducks and grebes, as these types of perches are too high and would cause keel damage if used.
- If waterproofed, ducks, grebes and swans will remain in the water rather than perching. However, if they are not waterproofed, netted floats or padded haul-out areas should be provided for these species.
- Herons and egrets require tall cages to prevent head trauma, as they tend to jump rapidly upwards.
- Wading birds bathe regularly and require pools up to 25cm in depth. Because they are wading birds, the depth should be graduated.
- Terns and oystercatchers will fly over and feed off water, but they do not float or bathe in deep water. These species benefit from graduated pools, with the depth proportionate to their size (e.g. shallower for smaller terns).
- All waterbirds are prone to foot problems such as Pododermatitis (bumblefoot) if they are housed in unsuitable numbers or kept on inappropriate substrate. Overcrowding or stressful group dynamics promotes aggression over perching spots, while perches with a rough or abrasive surface will also contribute to the problem. All perches must be easy to clean and be kept free of faecal and urinary waste.

Table 3: Minimum standards for housing waterbirds and seabirds

Note: this table is not intended to be used independently but should be read only in conjunction with the information in Chapter 8: Avian housing requirements.

Species	Stage 1 WxLxH	Stage 2 WxLxH	Stage 3 WxLxH	Pool size and depth	No. of birds	Codes
Duck Moorhens Coots Grebe	40x40x40cm	60x60x60cm	2x4x1.75m Alternative: 4.3m round gazebo style	Pool size: min surface area of water 1m ² 50cm deep pool	2	H AW FP ON PT AP
Darter Cormorant	42x67x48cm	1.2m ²	2x2x1.75m	Pool size: min surface area of water 1m ² 50cm deep pool	1	
Stilt Egret Heron Spoonbill	42x67x48cm	1.2m ²	2x2x1.75m	Pool size: min surface area of water 1m ² 50cm deep pool - graduated	1	AW A G S T
Oystercatchers Dotterel Plover	32x32x32cm	60x60x60cm	1.5x1.5x1.75m	Pool size: min surface area of water 1m ² 25cm deep pool - graduated	1 smaller size 2 larger size	AW
Swan	70x70x70cm	1.2m ²	2x2x2m	Pool min surface area of water 2.4m 60cm deep pool	2	PT AP
Pelican	1.2x1.2x1.2m	3x3m ²	3x3m Alternative: 3x9m round gazebo style	Pool size: min surface area of water 3m ² 70cm deep pool	1 2-3	P T A P S
Little penguin	40x40x40cm	1x1m ²	3mx3m	Pool size: min surface area of water 2.4m ² 30cm deep pool	3	AG A P H SO
Small seabirds including terns and seagulls	40x40x40cm	1x1m ²	2x2x1.75m	Pool size: min surface area of water 1m ² 30cm deep pool	2	N P T P P
Albatross Giant petrel	70x70x70cm	1.2m ²	2.5x2.5m	Pool size: min surface area of water 2.7m x 3.3m with 70cm deep pool. Walls 60cm above depth of pool	1	N P T P P S O A

Table 4: Codes for housing requirements used in Table 3, minimum standards for housing waterbirds and seabirds

AG	Note that these birds can be extremely aggressive, even with conspecifics. Use caution and observe the birds' interactions when introduced, before housing together and leaving unattended.
AP	These birds require pre-release conditioning aviaries that contain pools to swim in and suitable standing/perching surfaces.
AW	These birds require pre-release conditioning aviaries that contain shallow wading pools and a variety of perches, including some high perches.
FP	These birds have very sensitive feet. Provide as much wading area (in addition to a 'swimming' pool) as possible in all housing to help prevent husbandry injuries.
H	Provide natural vegetative material or human-devised areas for cover.
N	Should be housed on tightly stretched, suspended netting as a substrate whenever bird is not in water.
ON	When an individual of these species is housed in IC and is emaciated (pronounced keel) or not standing, it should be housed on suspended net/shade cloth bottom caging to protect feathers and keel until the bird is standing normally and is of normal weight. If the bird can stand normally and the keel is not extremely pronounced, housing substrate can be covered with towelling or matting.
PP	These species only require pool space during pre-release conditioning, but prior to release, individuals must be able to stay in a pool full-time without a haul-out area, for a minimum of 48 hours without compromise to their waterproofing.
PT	During recovery, birds should be allowed pool time for as long and as often as their medical condition allows.
SO	A surface overflow of the pool is required to maintain water quality. This can be achieved by constantly trickling a hose into the pool so that it overflows, or by filtering and recirculating water.
ST	These birds have stiff tail feathers and as soon as they are able to stand, they should be provided with a stump or stump-like perch to avoid feather breakage and soiling.

Housing for raptors

General raptor housing considerations

Sizing for raptor housing is based on a combination of the size and flight styles of the bird. While the cage information states a minimum rectangular size, consideration may be given to L-shaped enclosures to facilitate evaluation of flight and angling abilities, particularly if space is limited on a suburban block.

As with other caging, the rehabilitator is encouraged to expand upon and enhance these minimum requirements where practicable and create caging suitable to their location, facility, caseload and experience, while keeping in mind the natural behavioural and physical needs of the birds.

The needs of raptors present several challenges if successful release is to be achieved. Due to the predatory nature of raptors, each species should be housed separately. However, if the species is social in its natural environment it may be appropriate to house them together. With some species however, males and females should never be mixed.

Appropriate conditioning is crucial not only for foraging, but for territory defence and other behaviours.

Large flight aviaries are the easiest way to achieve fitness conditioning, but it should be noted that using large flight aviaries is not the only acceptable technique for pre-release preparation. With some raptors flight in an aviary is not adequate for post-release survival. Raptors that arrive in care before learning to hunt, and after fledging, are most affected. Species which actively pursue agile prey will require more extensive flight exercise, since even the largest aviary will cover only a fraction of the space of an actual hunt and pursuit.

If a rehabilitator is unable to provide a large release aviary/enclosure necessary for raptors, they can still act as a first point of call for a bird when it is handed in. When the animal is ready for the next stage it can then be passed on to a rehabilitator who has the facilities to adequately house it.

The sport of falconry is not legal in Western Australia and all rehabilitators wishing to use falconry based training techniques (free flying and creancing/tethered flight) for pre-release conditioning, assessment and release, must have written approval from Parks and Wildlife in the form of a Free Flying Licence for Rehabilitation.

Rehabilitators with minimal experience in dealing with raptors must obtain ongoing advice from approved, experienced raptor rehabilitation specialists on the use of these complicated release techniques, including 'hacking back' (for chicks), creancing (tethered flying) and free flight training, until such time as they have been assessed as being competent to use these techniques independently. Raptor rehabilitators experienced in these techniques can be contacted through the Community Involvement Coordinator at Parks and Wildlife.

During free flying and creance training, smaller-sized cages as described in specifications for Stages 1 and 2 will be sufficient to house birds. In some instances, Stage 1 caging may be more appropriate until the bird is conditioned to being tethered and has adapted to the training involved in flight conditioning. Raptors in stages immediately prior to release often need more exercise than can be provided by many rehabilitators.

Cooperation among rehabilitators is essential to ensure that birds are housed with an appropriately skilled rehabilitator with the correct environment for housing the bird.

Construction materials

Wherever possible, the frame for the structure should be on the outside to avoid the birds trying to perch on it or getting limbs caught between it and the wall material. This also makes cleaning easier.

Acceptable materials include:

- sealed (treated) wood, corrugated metal sheeting (Zincalume, steel, tin etc.)
- plastic and moulded fibreglass (indoor housing)
- opaque polycarbonate and fibreglass sheeting (reinforced with other materials)
- milled wooden or metal vertical bars / pickets / slats
- woven shade cloth
- plastic-coated chain link
- UV-stabilised nylon net (anti-bird for small birds or trawler netting for large birds).

Wire mesh must not be used on any surface where the bird can come into direct contact with it. Good quality wire mesh can be used for external structures as predator proofing. Wire doors on pet carriers used as hospital boxes must be covered on the inside.

High-stress raptors such as kites and hawks should be housed in facilities that eliminate or minimise visual and auditory stress. Solid-sided walls and/or vertical slats with no more than 2.5cm gaps are advisable.

When secluded cages are not available, or when additional visual occlusion is necessary, translucent material (e.g. bed linen) may be hung on the outside of the slatted cage. These materials allow some light to enter the enclosure and slits or holes in the material allow for better ventilation than solid-sided cages.

Furnishings

- Stable and easily cleaned furnishings.
- All perching substrates must be chosen carefully, based on the natural biology and size of the species.

- Natural branches with fibrous bark, blocks, and ring perches are appropriate for certain species of raptors. Perch coverings may include artificial material such as padded bandaging and true stadium astroturf (this is preferred over the fake grass known as 'Astroturf') and when used, more than one surface substrate may be offered per perch in each enclosure. Coverings must not be able to unravel.
- Perches should have some degree of 'give' for landings.
- Perches must be positioned to avoid the bird hitting walls with wing or tail feathers when landing and taking off of the perch. At least two perches should be placed in each cage (excluding Stage 1), preferably at different heights and different angles. Provision should be made for movement up to perches, down to feed or water, or across to another perch as this activity provides important exercise.
- Pools must be a minimum of 5–5cm deep and wider than the length of the raptor.

When circumstances allow, rehabilitated adult birds should be released in a suitable habitat as close as possible to the point of their capture.

Table 5: Minimum standards for housing raptors

Note: this table is not intended to be used independently; it should be used only in conjunction with the information in Chapter 8.

Species	Stage 1 WxLxH	Stage 2 WxLxH	Stage 3 WxLxH	Codes (key overleaf)
Pacific baza	35x50x40cm	1.2x1.8x1.8m	2.4x4.8x2.4m	
Letter-winged kite	35x50x40cm	1.2x1.8x1.8m	2.4x4.8x2.4m	SM
Black Shouldered kite	35x50x40cm	1.2x1.8x1.8m	2.4x4.8x2.4m	SM
Collared sparrowhawk	35x50x40cm	1.2x1.8x1.8m	2.4x4.8x2.4m	SM, JH
Australian hobby/little falcon	35x50x40cm	1.2x1.8x1.8m	6x20x4m	SM, FF, JH
Australian kestrel	35x50x40cm	1.2x1.8x1.8m	2.4x4.8x24m	
Boobook owl	35x50x40cm	1.2x1.8x1.8m	2.4x4.8x2.4m	
Barn owl	45x70x55cm	1.2x1.8x1.8m	2.4x4.8x2.4m	
Square-tailed kite	45x70x55cm	2x2x2m	6x20x4m	JH
Red goshawk	60x80x70cm	2x2x2m	6x20x4m	SM, FF, JH
Black breasted buzzard/kite	45x70x55cm	2x2x2m	6x20x4m	JH
Spotted harrier	45x70x55cm	2x2x2m	3x15x3.6m	JH, SM+ floor hide
Swamp harrier	60x80x70cm	2x2x2m	6x20x4m	JH, SM+ floor hide
Brahminy kite	45x70x55cm	2x2x2m	3x15x3.6m	SM, JH
Whistling kite	45x70x55cm	2x2x2m	3x15x3.6m	SM, JH
Little eagle	45x70x55cm	2x2x2m	3x15x3.6m	SM, JH
Black kite	45x70x55cm	2x2x2m	3x15x3.6m	SM
Brown goshawk	45x70x55cm	2x2x2m	3x15x3.6m	SM, FF, JH
Grey goshawk	45x70x55cm	2x2x2m	3x15x3.6m	SM, FF, JH
Brown falcon	45x70x55cm	2x2x2m	3x15x3.6m	
Black falcon	45x70x55cm	2x2x2m	6x20x4m	SM, FF, JH
Grey falcon	45x70x55cm	2x2x2m	6x20x4m	SM, FF, JH
Peregrine falcon	45x70x55cm	2x2x2m	6x20x4m	SM, FF, JH
Masked owl	45x70x55cm	2x2x2m	3x15x3.6m	
Grass owl	45x70x55cm	2x2x2m	3x15x3.6m	SM+ floor hide
Rufous owl	45x70x55cm	2x2x2m	3x15x3.6m	
Barking owl	45x70x55cm	2x2x2m	3x15x3.6m	
Osprey	60x80x70cm	2x2x2m	6x20x4m	
White-bellied sea	60x80x70cm	2x2x2m	6x20x4m	JH
Wedge-tailed eagle	60x80x70cm	2x2x2m	6x20x4m	JH

Table 6: Codes for housing requirements used in Table 5, Minimum standards for housing raptors

FF	F ree (uncaged) F light exercise needed to reach adequate fitness (unless bird has been in care for less than four weeks).
SM	S pecial M aterials suggested – lining aviaries with shade cloth will reduce injury in most cases while avoiding net-roofed aviaries will stop kites from getting toes entangled.
JH	J uveniles that are too old to be hacked back cannot learn to H unt adequately in a cage and will need to learn these skills during free flight.

CHAPTER 9 – REPTILE AND AMPHIBIAN HOUSING REQUIREMENTS

General reptile housing considerations

It has been recognised through extensive consultation with experienced herpetologists in Western Australia that wild reptiles require minimal conditioning prior to release. It is therefore appropriate to release most species of reptiles upon recovery from Stage 1 or at Stage 2.

Enclosure or holding cage sizes listed in Table 7 are the minimum sizes that are acceptable for most circumstances. Some reptiles and amphibians may have special keeping requirements that these recommendations will not adequately cover. As with all wildlife species, an understanding of the specific requirements and behaviours of reptiles and the application of that knowledge to their housing, both in terms of size, substrate and general furnishings, is essential for their proper care. For example, a snake species that ambushes prey would require less space than one that pursues prey. The minimum standard is to provide adequate space for the reptile to move and locate food and to provide an appropriate area to hide and/or bask, depending on the needs of that species.

The natural biology of each species will help to determine their preferences for microhabitat, thereby influencing husbandry practices.

Minimum standards for basic husbandry

- Reptiles should be housed in a secure, escape-proof enclosure of correct size, based on minimum standards.
- Supplementary heating, humidity and temperature gradient relevant to the species should be provided where relevant.
- Effective lighting must be provided according to each species' needs. This includes ultra violet (UV) lighting covering both UVB and UVA, and full or true spectrum lighting.
- Appropriate enclosure furniture should be used to provide an environment that is conducive to reducing stress and facilitating healing.
- Drinking water must be provided in a manner that the species identifies with. For example, some reptiles require misting to take in moisture and will not drink from standing water.
- Provision of adequate and appropriate food.

Construction materials

- Commercially made reptile enclosures that comply with the minimum standards, ranging from small holding boxes for lizards to large snake boxes, are available and, for some rehabilitators, may be a more convenient option than producing their own enclosures.

- A range of heavy duty plastic or fibreglass containers, of various sizes with secure fitting lids are commercially available and provide suitable short-term housing for reptiles.
- Treated wooden holding boxes with glass or Perspex front or top lid also make suitable reptile enclosures, but the wood must be sealed to allow for thorough cleaning and disinfecting.
- Glass tanks are also suitable but lack insulation, can be heavy to move around and difficult to store.
- Security of reptile enclosures is essential in order to reduce the risk of injury to the animals and to minimise the chance of escapes and the possibility of snake bite incidents.

All vivariums must be provided with adequate ventilation and appropriate level of humidity.

Substrates

Selection of an appropriate substrate is extremely important to the long-term health of any reptile and includes the following materials:

- Newspaper is safe, hygienic, easy to replace, absorbent and inexpensive.
- Recycled paper is also safe, hygienic and easy to replace on a regular basis.
- Aquatic species require padded substrates to prevent pressure sores on their feet, shell and other bony protuberances.
- Dry leaf litter (from a clean area) may be used if the reptile does not have any obvious wounds.
- Peat or sphagnum moss can be used for specific applications, such as with certain fossorial or burrowing reptiles, however if using this material care must be taken to prevent fungal build-up. The material should be discarded after use.
- Carpet or Astroturf can be used when housing aquatic tortoises to cover abrasive brickwork.
- Unbleached paper towelling is recommended for amphibians, but do not use printed paper or news print.
- Sand should only be used as a substrate for those species that habitually live in sandy areas. Most sand is abrasive and may be ingested, causing impactions.
- Moistened sand or vermiculite is recommended for gravid reptiles (carrying eggs).

Furnishings

Cage accessories may contribute to an animal's mental health, particularly in situations where rehabilitation occurs over an extended period.

An understanding of the species' natural biology and habitat preferences is essential in providing the appropriate standard of care in captivity. All reptiles must be allowed to hide, climb and bask as needed.

Table 7: Minimum standards for housing reptiles

Species	Stage 1 & 2 WxLxH	Stage 3 WxLxH	Max no. per enclosure
Stimson's python Black-headed python Young pythons up to 1m long	1/2 body length x 3/4 body length x 1/3 body length 30x90x50cm	NA	1
Carpet pythons	1/2 body length x 1/2 body length x 3/4 body length	NA	1
Death adder	50x30x45cm	NA	1
All other venomous snake species Up to 1.5m	45x90x45cm	NA	1
Small geckos	40x20x30cm	NA	2
Bluetongue lizards	30x90x40cm (3ft tank)	NA	2
King skinks	50x90x30cm	NA	1
Dragons	30x90x40cm (3ft tank)	NA	
Varanids Stage 1, 2 and 3 will rely on the length of the monitor's body	2x body length 1.5x body width 60cm high	3 x body length 2 x body width 60cm high	1
Adult longneck turtles	50x90x30cm	100x150x100cm pool with a dry land area. 20cm deep body of water General considerations: 5x animal's length 3x animal's length depth of water 3x animal's width Water must be heated	1
Amphibians	50x25x30cm	NA	4

CHAPTER 10 – MAMMAL HOUSING REQUIREMENTS

General guides for mammal housing are difficult to define due to the variation in size, temperament and life history of mammals. A 'one-size-fits-all', or 'one-style-fits-all' approach usually fails when you are housing mammals ranging from bats to kangaroos. However, some principles do apply to all mammal housing.

For example, a double door or similar construction is effective in preventing escapes, visual barriers between cages and between humans and cages provide stress relief to mammals, and pre-release cages should be isolated and placed in an area similar to release habitat, if possible.

Mammals that are sick, injured or being hand-reared may be housed in a hospital box, pet carrier, glass tank and a variety of suitable hand-rearing options, including baskets, eskies and hanging pouches. Selection of the most appropriate form of housing for any particular mammal will depend upon the size of the mammal and the rehabilitator's preferences based on experience and knowledge.

The task of hand-rearing mammals and the standards required to complete this process is beyond the scope of these *Standards*. There are many tried and tested methods and a vast number of experienced rehabilitators who hand rear the wide range of mammal species in Western Australia. For the purpose of the minimum standards for housing sizes, all hand-rearing cases have been placed into Stage 1 for their basic needs.

This does not include the information required for the in-depth, daily care that mammals require during this period. This information must be sourced from the vast network of rehabilitators in WA, and from appropriate reference books listed under 'Recommended reading'.

Minimum standards for basic husbandry

- Supplementary heat must be provided for mammals in Stage 1 (and in some Stage 2 cases).
- Appropriate humidity must be provided.
- Suitable materials for nesting and security must be provided.
- Suitable furniture and substrate must be provided.
- Companionship should be considered if appropriate to the species.

Hand-reared macropods and rehabilitation standards

The following methods have proved successful in hand rearing, rehabilitating and releasing macropods back into the wild and have been adopted as minimum standards:

- Juvenile macropods **must** be placed with others of the same species or family as they enter into the Stage 2 of the rehabilitation process, if not earlier.
- Stage 2 joeys require a safe exercise area with unlimited access to return to their 'pouch' at any time.
- Companion animals such as cats and dogs **must** be excluded from all areas where Stage 2 and 3 joeys are exercising, acclimatising to life outside the pouch and learning to explore the area.
- The joey exercise area must be a secure environment where the joey can see out beyond the immediate area and be exposed to environmental stimulation such as smells and changes in weather.
- It is the rehabilitator's discretion as to whether an animal should complete Stage 3 using an additional two-stage approach:
 - Stage 3.1: joeys are moved into a small exercise yard approximately 10mx10m;
 - Stage 3.2: joeys are then move into the pre-release conditioning yard as noted as Stage 3 Minimum Standard sizing (20mx30m).
- The final part of Stage 3 will exclude 'hands-on' contact between the rehabilitator and the animal. The macropod will be prepared environmentally and nutritionally for a soft or hard release.

Construction and furnishings

Echidna – require a deep-packed substrate to a minimum depth of 20cm to provide for digging. Large termite logs should be provided to facilitate natural foraging behaviour and physical activity. Stage 3 enclosures should have a concrete base or sub-soil wire mesh underlay to prevent animals from burrowing out of the enclosure.

Enclosures must have 1.2m high smooth walls set a minimum of 50cm into the ground below the substrate to reduce escape by digging and deny access to predators. Chain link fencing can be used provided a smooth barrier such as flat galvanised iron sheeting is installed on the inside of the fence to a minimum height of 60cm to prevent animals from climbing out of the enclosure. Adequate shade must also be provided to allow for temperature gradient while still allowing animals access to sunlight.

Bats – wire mesh is not suitable for bat enclosures as it is abrasive and can injure bats if they fly into it. It is also subject to corrosion upon exposure to bat

urine. Non-abrasive materials, such as polyethylene mesh, are preferable for all enclosure and holding-box construction. Bats should also be provided with shelter from inclement weather ensuring that a minimum of one third of the enclosure is completely enclosed. Sharp objects or fittings that may cause wing membrane trauma when bats are flying and landing should not be used or placed in the enclosure.

Suspended landing areas, such as hanging towels, flannelette squares etc should be placed at each end of the enclosure to encourage flight and landing activity.

Insectivorous bats – roosting pouches or boxes must be placed at each end of the enclosure preferably along the ceiling. A bright light source should be installed above the ceiling of the enclosure to attract insects into the area, which the bats can feed upon. This provides the bat with a flight path from one end of the enclosure to the other with the opportunity to catch insects along the way. If the light source is positioned inside the enclosure it must have a wire cover over the globe to prevent bats from coming in contact with hot light fixtures.

Insectivorous bats must also be provided with an appropriate water source within the enclosure.

Flying fox – roosting sites comprising cloth squares pegged to the roof of the enclosure should be provided in the highest point in the enclosure. Flying foxes must also be provided with and have easy access to food stations and water bottles for holding blossoms.

Flying foxes enclosures should be fitted with mist sprays as they need humidity and are unable to cope with high, dry temperatures (>42°).

Small dasyurid and antechinus – these small marsupial species may be held in glass tanks or wooden holding boxes with fine 6.5mm² mesh doors or lids during pre-release conditioning. It is difficult to generalise for such a large and diverse group of animals, so rehabilitators are advised to refer to the natural biology of the particular species undergoing rehabilitation for a better understanding of their habitat requirements. Small nest boxes are appropriate in most situations and basking lamps may be utilised for some species.

Chuditch – chuditch are semi-arboreal mammals and must be provided with both ground space covered with a suitable substrate and some logs for climbing. At least two nest boxes should be provided. One of these should be installed at ground level and one above ground that the animal can access by climbing up a branch leading to the nest box. A hammock made from flannelette material is often favoured by these animals and a basking lamp may also be used.

Sugar gliders – standard enclosure setup, but minimise furniture to allow for gliding. Sheltered nest box with communicating branch to food. Consider provision of supplementary heat to encourage activity for quicker release.

Possums – nocturnal arboreal mammals, so height of the enclosure is important. Provision of climbing branches at various heights to promote climbing

is required. Aim to maximise the use of all vertical space to reduce their need to come to the ground for any reason. Good foliage cover provides security and will encourage activity.

Brushtail possum – heavy-duty climbing branches or ropes can be used for climbing. Appropriately sized nest box and nesting material must be provided. Browse holders positioned high up near the nest boxes to allow for provision of native flora.

Ringtail possum – light-weight climbing branches, ropes can be used for climbing. Drey and/or nest box with nesting material must be provided. Foliage holders positioned high up near the nest boxes to allow for provision of native foliage and flowers.

Honey and pygmy possums – enclosures for these animals must have fine 6.5mm² mesh on the outside to prevent escapes and vermin predation. Honey and pygmy possums require a complex arrangement of vertical and horizontal climbing branches. They should be provided with a nest box that is directly connected to a climbing branch, while the enclosure should have a leaf litter substrate. If an enclosure is not available for pre-release conditioning, a veranda aviary may be considered, provided it is fitted with additional fine mesh.

A large glass tank may also be used, but a disadvantage of this is that it does not allow for acclimatisation to natural weather conditions.

Bandicoot – nocturnal, terrestrial mammal. Provision of appropriate floor space and substrate for foraging to a minimum of 10cm deep. Provision of 0.5m solid structure up the sides of the enclosure to avoid climbing/jumping. Enclosure mesh no greater than 1.2cm. A nest box must be provided but bandicoots will nest just under the leaf litter, tussocks and in hollow logs.

Bilby – nocturnal, terrestrial mammal. Require burrowing environment. Stage 2 holding enclosure must be filled with dry clay-free river sand to a minimum depth of 23cm. Service area can be reduced to 5cm depth.

15cm diameter black polypipe, laid out in 'U' formation, creating a 6.5m tunnel directly to the nest hutch. Nest hutch minimum size 40cm² with top-lifting lid in addition to front access attaching directly to the piping.

Stage 3 enclosures or yards require natural vegetation and soil/substrate containing sufficient fine grain/clay to hold burrow structures up to 2m deep with 20cm diameter tunnels without collapse. Natural shrub/tree vegetation with good root systems. This allows for normal burrowing and food foraging behaviour.

Thermoregulation is essential in the acclimatisation of bilbies that are being released back into the wild and natural substrate allows this through self-selection of burrow depths. To prevent escape, a minimum of 60cm wide chicken wire, mesh skirt on the inside of fences at a depth of about 50cm is usually sufficient in a minimum size enclosure of about 10mx10m. This size enclosure could hold several young animals or a pair of adults. Young bilbies have been known to climb and if a roof is not utilised; an internal overhang

should be included on all sides and corners. This is in addition to an outward-facing overhang described below, to prevent predator incursions.

Small macropods (e.g. woylies, quokkas) – predator-proof fencing is essential. Enclosure mesh must not exceed 5.5cm². Outward facing overhang of approximately 60cm, at an angle between horizontal and 45°. Secure spots to shelter and nest, including shrubs, tussocks and small 'A' framed wooden shelters (avoid placing anything on the fence line).

Protected feeding station or 'shed' facing away from prevailing winds. Rounded corners on fences may help to prevent fauna injuring themselves by guiding fauna around corners, instead of ending in an abrupt 90° turn.

Large macropods – large open yard, relatively free of obstacles; east-facing shelters large enough to allow more than one animal to congregate. Protected feeding station or 'shed' facing away from prevailing winds. Provision of dust baths.

Wallaby – well covered habitat, shrubs, 'A' framed hides. Rock wallaby require elevated platforms; these can be made of piles of rocks, weatherproof tables, platforms and branching trees. Small cave-like structures will provide security and promote natural behaviour. Protected feeding station or 'shed' facing away from prevailing winds.

Yard requirements for macropods

Yards of varying sizes are required for appropriate rehabilitation. The size will vary depending on the stage of development the macropod is currently at.

Minimum standards for pre-release yards for large macropods and wallabies are:

- Predator-proof fencing incorporating minimum of 50mm² mesh fencing to a minimum height 1.8m.
- Wire placed 35cm beneath the ground, or external deterrents e.g. barbed wire, or a moat around the base of the mesh.
- If climbing species are to be enclosed by unroofed fences, then the fences must be made of material that is not climbable and a minimum height of 2m or rimmed by a 45-degree outrigger (0.5m wide facing into the enclosure).
- Minimal furniture to reduce accidents and injuries.
- Shade through the yard.
- Self-feeders and water troughs for minimum disturbance.
- There are variations in developmental stages of macropod joeys when they reach Stages 2 and 3. This will be determined by access to other macropods, health and the experience of the rehabilitator. This will have an impact on the size of the yard that the macropod is placed in. To allow for rehabilitator discretion, two sizes have been included at Stage 3 as minimum standards, and the larger sized yards are always preferred where available.

It is uncommon that fully grown, wild adult kangaroos survive the injuries associated with motor vehicle accidents and therefore they are not commonly in rehabilitation and release programs.

Table 8: Minimum standards for housing mammals

Note: This table should be used in conjunction with the information in Chapter 10.

Species	Stage 1 WxLxH	Stage 2 WxLxH	Stage 3 WxLxH	Max no. in Stage 3
Insectivorous bat	18x25x20cm	59x60x70cm	3x5x2m	6-8
Fruit bat	30x43x36cm	59x93x59cm	4.5x13x4m	4-6
Dunnarts and Antechinus species	20x32x32cm	30x91x40cm	30x91x40cm	6
Pygmy possum Honey possum	20x32xx32cm	60x26x30cm	1x1x1m	2
Sugar glider	20x32xx32cm	90x90x90cm	2x5x1.75m	4
Ringtail possum	30x43x36cm	90x90x90cm	90x1.8x1.8m	2 must be related)
Brushtail possum	30x43x36cm	1x1x2m	2x3x1.75m	1
Bandicoot	<u>juveniles</u> 20x32x32cm <u>adults</u> 30x43x36cm	1x1x0.8m	2x3x1m	1
Bilby	30x43x36cm	2x4x1.75m	10x10m	2
Chuditch	<u>juveniles</u> 20x32x32cm <u>adults</u> 30x43x36cm	1x1x.8m	2x3x1.75m	2
Echidna	50x71x51cm	60x91x53cm	6x6x1.2m	2
Small macropods	50x71x51cm	60x91x53cm	15m ²	15
Wallabies	60x91x53cm	5x5m	20x30m	7-10
Large macropods	60x91x53cm	5x5m	See notes on 2 stages in Stage 3 Stage 1 – 10x10m Stage 2 – 20x30m	7-10

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GLOSSARY

- Acclimatisation – To habituate to a new climate or environment.
- Altricial – Young fauna that requires feeding by parent.
- Ambient – Relating to the immediate surrounding area
- Arboreal – Tree-climbing / tree dwelling
- Astroturf – Fake grass.
- Bumblefoot – Pododermatitis (foot inflammation). Describes inflammation on the underside of the feet in birds, ranging from swellings to open infected wounds.
- Carcass – The dead body of an animal.
- Cetacean – Fauna in the order of marine mammals that includes whales, dolphins and porpoises
- Cloaca – Posterior opening serving as the urinary, intestinal and reproductive tracts in certain animal species. All amphibians, birds, reptiles and monotremes possess these openings.
- CNS – Central Nervous System
- Colonial - Living in groups or colonies.
- Conditioning – The learning process.
- Conspecific – Belonging to the same species.
- Contagious – Carrying or spreading a disease.
- Creance – A cord secured to the leg of a raptor to prevent escape during training.
- Diurnal – Active during daylight.
- Disposition – Mental inclination or willingness.
- Euthanase – Induction of death, with minimal pain, stress or anxiety.
- Exsanguination – Process of fatal blood loss
- Falconry – Sport of hunting using trained falcons or other birds of prey.
- Fauna – Collective term for animals that are indigenous to a state or country, or that migrate to that state or country.
- Foliage – Leaves, flowers and branches
- Fossorial – Adapted to digging and life underground
- Gravid – stage where reptile is holding or carrying eggs prior to laying
- Hard release – Release of an animal with no supplementary food and/or shelter.
- Herpetologist – One who studies reptiles and amphibians.
- Imping – Technique in which unbroken feathers from one bird are used to repair the feathers of another.
- Imprinting – in fauna, the irreversible behavioural process whereby a newborn or young animal recognises and is attracted / socially bonded to another animal of its own kind, or a substitute (such as a human or inanimate object)
- Intracoelomic - into body cavity
- Intracardiac - into heart
- Intrahepatic - into the liver
- Intramuscular - into muscle

Intrapulmonary - into the lungs
Isolation – Complete separation from others.
Macropod – from the marsupial family Macropodidae which includes kangaroos, wallabies, tree-kangaroos, quokkas, pademelons etc
Microhabitat – Small, isolated habitat, differing in character from its surrounding area.
Migratory – Making regular seasonal geographical movements.
Monotreme – Mammal that lays eggs instead of giving birth to live young e.g. echidna or platypus
Nocturnal – Active during the night.
Optimum – Best or most favourable.
Palpation – Physical examination carried out by feeling with hands and fingers
Palpebral – Relating to the eyelids
Pelage – Hair, fur, wool or other soft covering of a mammal.
Pelagic – Relates to something living in or on the ocean
Photoperiod - Period of time each day during which an organism receives illumination; day length
Pinnipeds – Fin-footed, semi-aquatic marine mammals e.g. seals
Pithing – Destruction or severing of spinal cord, causing death by destroying ascending sensory (pain) pathways, resulting in depression of Central Nervous System, respiratory and cardiac functions
Pododermatitis - Bumblefoot.
Post Mortem – Examination of the body after death.
Precocial – Active and self-feeding soon after birth or hatching.
Quarantine - The act of isolating individuals, for the duration of the incubation period of most diseases for which they may have been exposed.
Records – Written document for the purpose of preserving evidence.
Rehabilitation – Restoration to former health, rights and privileges.
Sirenian – Fauna in the order of aquatic, herbivorous mammals – e.g. manatees and dugongs
Soft release – Release of animal with provision of supplementary food and/or shelter for a time.
Substrate – Material placed on a cage bottom.
Terrestrial – Living on the ground.
Thermoregulation – Regulation of body temperature.
Varanid – Genus of medium to large terrestrial lizards.
Zoonosis (pl. zoonoses) – Infectious diseases transferred from animals to humans.

Appendix A: Facility review

The information and questions contained in this form are a means for rehabilitation facilities and individual rehabilitators to do a self-evaluation or self-review. The purpose is to provide wildlife care-givers suggestions to save time (e.g. keeping reference materials at the phone), to ensure wildlife receives appropriate housing and medical treatment (exam area, caging and veterinary treatment), and to protect both wildlife and humans from disease and contamination (food preparation, disinfecting, housekeeping).

Not all items contained in the form will apply to everyone. For example, an individual rehabilitator does not require a grievance committee, but this form does provide an easy reference to be sure important considerations are not overlooked when changes such as facility growth occur.

Facility review

1. ORGANISATIONAL STANDARDS

Safety

- Is there a fire plan?
- Is the fire plan published and accessible to all?
- Are there regular fire drills?
- Is there a fire alarm?
- Is there a fire extinguisher(s)?
- Is there an evacuation plan ?
- Is the evacuation plan published and accessible to all?
- Are eating, drinking restricted to designated areas?
- Is there a designated smoking area or smoking policy ?
- What is the policy for smokers in the bushfire season ?
- Is there a first-aid kit available and accessible for staff/volunteers?
- Are material data safety sheets (MSDSs) readily available/easily accessible for those chemicals used at the facility (disinfectants, cleansers, etc.)?

Telephone services

For those providing help, assistance, and directions to the public, protocols have been established to provide assistance in the following areas:

- Humanely preventing or reducing wildlife problems, conflict situations, and injury.
- Determining if fauna in fact needs to be rescued.
- Providing strategies and techniques to give opportunities for parent birds to retrieve temporarily displaced young or to place back in nest.
- Suggesting safe capture, restraint and transport techniques to minimise risk of injury to fauna and to humans.

Procedures

The following procedures should be considered by all wildlife rehabilitation centres:

- Does the organisation have operational policies freely available and accessible to staff members and volunteers (operations manual, rules derived from Board decisions, training materials etc.)?
- Is your Constitution freely available to all staff and volunteers?
- Does the individual or organisation comply with local ordinances and have current State, provincial or federal permits for the work being done?
- Is there a grievance policy for staff/volunteers?
- Is there a training policy for staff/volunteers?
- Are there continuing training opportunities for staff (paid and volunteer) that have completed basic skills training (staff training sessions, Parks and Wildlife courses, etc.)?
- Is there a liability insurance policy for volunteers to protect the facility and/or organisation?
- Is there a workers' compensation policy for employees?
- What after-hours services are available for emergency cases (on-call person, emergency veterinary clinic services, etc.)?
- Are there written policies to instruct the volunteers regarding rules of the organisation as they relate to animal care, reporting procedures and rules on conduct?

Ongoing education

- Are manuals/books available on the topic of providing humane solutions to human-wildlife conflicts?
- Are publications available which describe the various fauna species and their natural biology?
- Is pertinent information collected on wildlife rehabilitation?
- If such information is collected, is it shared with other wildlife rehabilitators?
- Do you attend or does your rehabilitation centre encourage volunteers to attend education classes or conferences on wildlife rehabilitation?

2. RECEIVING AREA

Public information

- Are there written policies or procedures for staff and volunteers dealing with wildlife problems?
- Do you have information available to provide to the public to advise them of the services provided for wildlife?

Facilities

- Is the reception area neat and presentable?
- Is it organised in a manner that ensures resident patients are not subjected to stress when new fauna patients are admitted?

3. EXAMINATION AREA

- Is the area clean?
- Is the area set up so that fauna can be examined safely?
- Are first-aid supplies readily available and accessible to all?
- Are scales available to weigh fauna as part of the admission and assessment process?
- Are fauna awaiting examination/treatment provided with a warm, quiet and dark place?
- Are facilities arranged and/or constructed to minimise stress on the fauna?
- Are the sound and activity levels minimised to reduce stress on the animal?
- Are capture and handling equipment easily accessible and maintained in good working order to ensure safe use?
- Are capture, handling and restraint procedures safe for both fauna and humans?
- Have the people handling wildlife been trained in safe handling techniques?

4. FACILITIES FOR FIRST AID/INTENSIVE CARE

- Are heat sources (hotbox, lamps, heat pads) available for use if required?
- Is the first aid/IC area clean?
- Is it a low-use area?
- Are all the required medications on hand?
- Are other prescription medications available through supporting veterinary clinics?
- Are prescription drugs kept in a locked, secure location?
- Is there a log to document the use of prescription drugs?
- Are emergency medications available?
- Are the following facilities available at a veterinary clinic if required:
 - Experienced wildlife veterinarian/nurse?
 - Anaesthetic equipment?
 - X-ray equipment?
 - Housing facilities?

5. INITIAL CARE FACILITIES

- Do cages meet the minimum caging standards for the species handled?
- Are cages constructed in such a way that they can be readily cleaned and disinfected (e.g. stainless steel, fibreglass, plastic, sealed wood, 'pet packs')?
- Are the cages cleaned regularly (as appropriate for the species and cage type)?
- Is the area adequately ventilated in an appropriate manner?
- Is there adequate lighting (full-spectrum light at the appropriate hours)?
- Are isolation facilities available?
- Is the treatment/holding area away from the main flow of human activity?
- Is there access to the area by domestic pets?

6. PRIMARY EXERCISE CAGING

- Do cages meet minimum caging standards for the species being handled?
- Are they able to be easily cleaned?
- Is there a regular cleaning schedule?
- Are cages safe for the rehabilitators and for any fauna being held (e.g. no loose or sharp wires or nails, double doors etc)?
- Are cages secure (e.g. lockable, sturdy, safe from predators)?

7. HYGIENE

- Is there a standard procedure and schedule for cleaning and disinfecting cages, feeding utensils, syringes, food storage containers, and food, water, and bathing bowls?
- Are cleaning and disinfecting supplies readily available and correctly stored?
- Is personal protective equipment (gloves, masks, goggles) readily available for workers?
- Are instructions on the proper use of disinfectants clearly displayed?
- Is there a designated area for cleaning and disinfecting dirty items?
- Is there a designated area for separate storage of clean and disinfected items?

8. HOUSEKEEPING AND MAINTENANCE

- Is there a prescribed schedule or program for:
 - daily cleaning?
 - weekly cleaning?
 - seasonal cleaning?
 - repair and upkeep of the facility?

9. FOOD PREPARATION AND STORAGE

- Is the area clean and orderly?
- Are adequate foodstuffs and supplies available?
- Are foodstuffs correctly stored (e.g. fruit and vegetables stored separately from meat products)?
- Are perishable foodstuffs such as open formula, dated?

Appendix B: Fauna Admission Form (Example only)

Species: _____

Age (e.g. Adult/chick/juvenile): _____

Sex: _____ Date: _____

ID (e.g. leg band #): _____

Presenter's name: _____

Address: _____

Contact number (Home): _____

Mobile: _____

HISTORY

Exact location where animal was found (include details of what park, beach or street, in a backyard, building site, footpath, etc):

Date and time animal found:

What is wrong with the animal (any obvious injuries)?

What was the animal doing when found - i.e. - lying curled up, flapping frantically but not flying, lying on its back, not standing, etc)?

Has any medical treatment been given, if so what?

Has the animal been seen by a vet, if so, which one?

Did you feed the animal? Yes / No - If yes, what & how?

How has the animal been housed? (e.g.- in a box, cage, heating supplied)?

What else did you do to help the animal?

Are you willing to pick the animal up for release if needed?

Yes / No

Appendix C: Fauna Examination Form (Example only) – Birds

Date: ___/___/___ Species: _____

Arrival weight _____

Case#: _____ Time _____

Body Condition: Emaciated / Underweight / Normal / Overweight

Comments on Body Condition:

Age/Sex (if known): _____

Hydration: Good / Fair / Poor

Attitude:

Nares: Clear / Not clear - Remarks:

Respiration: Remarks:

Crop: Full / Empty Remarks:

Gi Tract/Abdomen: Remarks:

Droppings: None - Remarks:

Eyes: Remarks:

Ears: Remarks:

Feathers: Remarks

Ectoparasites? Remarks:

Skin: Remarks:

Feet: Remarks:

Nervous System: Remarks:

Musculoskeletal: Remarks:

Injuries/Problems (Wounds, Etc.):

Note: BAR = Bright, Alert, Responsive

3-Day Assessment:



Appendix D: Transporting injured wildlife

Certain situations create the need to transport injured wild animals. In Western Australia even reaching the local veterinary practise might require long-distance transport; and specialist care might only be available by air travel.

Injured wild animals have specific requirements when they are transported and every case has to be addressed individually. However, there are minimum standards which should be followed when transporting injured animals.

- (a) All injured wildlife should be assessed by a veterinarian, wildlife officer or experienced wildlife rehabilitator before transport. Severely compromised animals should not be transported over long distances if avoidable. First Aid should be given where required, but complex bandages or specialist veterinary care should only be provided by experienced veterinarians or veterinary nurses. If no professional personnel are available at the site; the situation should be discussed with a veterinarian or experienced wildlife rehabilitator over the phone prior to transport.
- (b) Every injury or known medical history should be communicated to the receiving party before the animal is transported.
- (c) The containers must be secure and escape-proof.
- (d) The container must provide adequate ventilation.
- (e) There should be drapes on the outside of the containment box to shelter the animal from most of the light and disturbance around it. This should not interfere significantly with the ventilation of the container.
- (f) Some species will require inner padding of the box or pet pack, especially bird species with heightened flying response.
- (g) Direct restraint of the wild animal by body wrapping, wing bandages or leg fixations is NOT recommended.
- (h) Limit exposure of animals to sudden movements, extremes of temperature, noise, visual disturbance and vibration.
- (i) For most species the temperature should be kept to below 25 degrees C.
- (j) Duration of the transport should be kept to a minimum.
- (k) Compromised and depressed wild animals will not consume any food or water and it is recommended to leave them without food/water, as they might fall into the bowls and injure themselves or suffocate.

If you require further information on transporting wildlife, please contact Parks and Wildlife's Nature Protection Branch on 9219 9840, or Perth Zoo on 9474 0444 or 0439 953 026.



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