

Global Federation of Animal Sanctuaries



**Global Federation of
Animal Sanctuaries**

Standards For Monotreme, Marsupial and Small Insectivore Sanctuaries

Version:

December 2019

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Table of Contents

INTRODUCTION.....	1
GFAS PRINCIPLES	1
ANIMALS COVERED BY THESE STANDARDS.....	1
STANDARDS UPDATES	2
MONOTREME, MARSUPIAL AND SMALL INSECTIVORE STANDARDS	3
MONOTREME, MARSUPIAL AND SMALL INSECTIVORE HOUSING	3
H-1. Types of Space and Size	3
H-2. Containment	6
H-3. Ground and Plantings.....	8
H-4. Transfer Doors.....	10
H-5. Shelter	11
H-6. Enclosure Furniture.....	11
H-7. Sanitation	13
H-8. Temperature, Humidity, Ventilation, Lighting	14
NUTRITION REQUIREMENTS.....	16
N-1. Water	16
N-2. Diet.....	18
N-3. Food Presentation and Feeding Techniques	20
N-4. Food Storage.....	20
N-5. Food Handling	21
VETERINARY CARE.....	21
V-1. General Medical Program and Staffing	21
V-2. On-Site and Off-Site Veterinary Facilities	22
V-3. Preventative Medicine Program	22
V-4. Clinical Pathology, Surgical, Treatment and Necropsy Facilities	23
V-5. Quarantine and Isolation of Monotremes, Marsupials and Small Insectivores	24
V-6. Medical Records and Controlled Substances	25
V-7. Breeding/Contraception.....	26
V-8. Zoonotic Disease Program.....	27
V-9. Euthanasia	29
WELL-BEING AND HANDLING OF MONOTREMES, MARSUPIALS AND SMALL INSECTIVORES	28
W-1. Physical Well-Being	29
W-2. Social Housing	30
W-3. Introduction of Unfamiliar Individuals	30
W-4. Behavioral/Psychological Well-Being.....	32
W-5. Monotreme, Marsupial, Small Insectivore-Caregiver Relationships.....	32
W-6. Handling and Restraint.....	34



W-7. Animal Transport 35

MONOTREMES, MARSUPIALS AND SMALL INSECTIVORES BEING RELEASED TO THE WILD 34

R-1. General Considerations 36
R-2. Rescue Of Monotremes, Marsupials and Small Insectivores 37
R-3. Evaluation Of Suitability For Release 37
R-4. Quarantine And Prerelease Housing 38
R-5. Diet, Nutrition And Foraging Skills 40
R-6. Husbandry And Health 40
R-7. Health And Safety Of Caregivers Working With Releasable Monotremes, Marsupials and Small Insectivores 41
R-8. Assessment of Health and Skills 41
R-9. Determining Appropriate Release Sites 42
R-10. The Release Process And Post Release Monitoring 42

APPENDIX 1 44

INTRODUCTION

GFAS PRINCIPLES

The Global Federation of Animal Sanctuaries (GFAS) will designate an organization as “verified” or “accredited” based upon its substantial compliance with the standards listed below. GFAS recognizes that some organizations under consideration will operate valid rescue and rehabilitation programs with a goal of releasing wildlife to the wild pursuant to IUCN and/or other international or national standards. For those animals, lifetime sanctuary care may not be part of the organization’s mission. While the care for these animals may be provided on an interim basis only, the organization is still expected to meet the standards below with regard to all animals in its care and for purposes of these standards it will be identified as a “sanctuary.”

Consistent with GFAS’ philosophy and the standards below, it is expected that a sanctuary does not adopt policy positions that are in opposition to the welfare of the species of animals in the care of the sanctuary (for example, while it is not required that a primate sanctuary affirmatively promote a policy against laboratory research using primates, it should not promote a policy in favor of such research).

Note: Several standards make reference to a sanctuary’s “Director.” GFAS recognizes that a sanctuary may use a different title, and the term “Director” is intended to reference the sanctuary’s Sanctuary Director, who may be called an Executive Director or Chief Executive Officer, etc.

GFAS also recognizes that sanctuaries may rely on volunteers for certain functions, including some aspects of animal care (such as food preparation). Standards referencing “staff” may take into account appropriately qualified and trained volunteers as well as employees.

Appendix I of this document provides further guidance/suggestions on facility design and monotreme/marsupial/small insectivore care. These are not requirements but rather provide sanctuaries with access to knowledge gained from experience at other sanctuaries/monotreme, marsupial and small insectivore care facilities.

ANIMALS COVERED BY THESE STANDARDS

Note: Many mammal species consume insects as part of their diet. The species included in this standard are, however, primarily insectivorous. Aardwolves, although largely insectivorous, are included in the Feliform standards, along with the other hyenas.

Family / Genus/Common Names

- a. Family: *Acrobatidae*, *Bradyrodidae*, *Burramyidae*, *Caenolestidae*, *Chrysochloridae*, *Cyclopedidae*, *Dasyrodidae*, *Dasyuridae*, *Didelphidae*, *Erinaceidae*, *Hypsiprymmodontidae*, *Macropodidae*, *Manidae*, *Megalonychidae*, *Microbiotheriidae*, *Myrmecobiidae*, *Myrmecophagidae*, *Nyctibiidae*, *Notoryctidae*, *Ornithorhynchidae*, *Orycteropodidae*, *Peramelidae*, *Petauridae*, *Phalangeridae*, *Phascolarctidae*, *Pseudocheiridae*, *Tachyglossidae*, *Talpidae*, *Tarsipedidae*, *Tenrecidae*, *Thylacomyidae*, *Tupaiidae*, *Vombatidae*
- b. Genus: *Acrobates*, *Ailurops*, *Amblysomus*, *Anathana*, *Anourosorex*, *Antechinomys*, *Antechinus*, *Atelerix*, *Blarina*, *Blarinella*, *Bradypus*, *Burramys*, *Cabassous*, *Caenolestes*, *Calyptophractus*, *Calcochloris*, *Caluromys*, *Caluromysiops*, *Carpitalpa*, *Cercartetus*, *Chacodelphys*, *Chaetophractus*, *Chlamyphorus*, *Chimarrigale*, *Chironectes*, *Chlorotalpa*, *Chodsigoa*, *Choloepus*, *Chrysochloris*, *Chrisopalax*, *Cryptochloris*, *Condylura*, *Congosorex*, *Crociodura*, *Cryptonanus*, *Cryptotis*, *Cyclopes*, *Dactylonax*, *Dactylopsila*, *Dasyercus*, *Dasykaluta*, *Dasyurus*, *Dasyuroides*, *Dasyurus*, *Dendrogale*, *Dendrolagus*, *Desmana*, *Didelphis*, *Diplomesodon*, *Distoechurus*, *Dorcopsis*, *Dorcopsulus*, *Dromiciops*, *Dymecodon*, *Echinops*, *Echinosorex*, *Echymipera*, *Erinaceus*, *Elephantulus*,



Episoriculus, Euphractus, Eremitalpa, Euroscaptor, Feroculus, Galemys, Glironia, Gracilinanus, Gymnobelideus, Hemibelideus, Hemiechinus, Holomys, Hyladelphys, Hypsiprymnodon, Isoodon, Lagorchestes, Lagotrophus, Lasiorhinus, Lestodelphys, Lestoros, Lutreolina, Macropus, Macrotis, Macroscelididae, Manis, Marmosa, Marmosops, Megasorex, Melasmothrix, Mesechinus, Metachirus, Microgale, Microperoryctees, Micropotamogale, Mogera, Monodelphis, Murexia, Myoictis, Myosorex, Myrmecobius, Myrmecophaga, Nectogale, Neomys, Neophascogale, Neurotrichus, Ningai, Neohylomys, Neotetracus, Notiosorex, Notoryctes, Nyctibius, Onychogalea, Ornithorhynchus, Orycteropus, Oryzoricetes, Paracrocidura, Paraechinus, Parascalops, Parascaptor, Parentechinus, Perameles, Peroryctes, Petauroides, Petaurus, Petrodromus, Petrogale, Petropseudes, Phalanger, Phascogale, Phascolarctos, Phascolosorex, Phataginus, Philander, Planigale, Platypus, Podgymnura, Potomogale, Priodontes, Pseudantechinus, Pseudocheirus, Pseudochirops, Pseudochirulus, Ptilocercidae, Ruwenzorisorex, Rhynchocyon, Rhyncholestes, Rhynchoemeles, Sarcophilus, Scalopus, Scalopanulus, Scapanus, Scaptochirus, Scaptonyx, Scutesorex, Setonix, Sminthopsis, Smutsia, Solisorex, Sorex, Soricidae, Spilocuscus, Strigocuscus, Suncus, Surdisorex, Slyvisorex, Tachyglossus, Talpa, Tamandu, Tarsipes, Thylamys, Thylogale, Tlacuatzin, Tolypeutes, Trichosurus, Tupaia, Urgale, Uromanis, Uropsilus, Urotrichus, Vombatus, Wallabia, Wyulda, Zaedyus, Zaglossus

- c. Common names: armadillo, bandicoot, bilby, caenolestid, cuscus dasyure, desman, dibbler, dorcopsis, dunnart, echidna, echymipera, elephant shrew, four-eyed opossum, glider, gliding possum, gracile opossum, gymnure, hare wallaby, hedgehog, kaluta, kangaroo, koala, kowari, kultarr, marsupial mole, mouse opossum, mole, mole-tenrec, monito del monte, moonrat, mulgara, nailtail wallaby, ningai, numbat, opossum, otter-shrew, pademelon, pangolin, phascogale, pichi, planigale, platypus, possum, potoroo, pygmy possum, Quokka, quoll, rat kangaroo, ringtail, rock wallaby, sengi, shrew, shrew-mole, shrew-opossum, shrew tenrec, short-tailed opossum, slender opossum, sloth, sugar glider, striped opossum, swamp wallaby, tamandua, Tasmanian devil, tenkile, tenrec, tree kangaroo, treeshrew, triok, water opossum, water shrew, wallaby, wallaroo, wombat

Version Updates

New and Updated content released on February 2015

- G-1 Nonprofit/ Non-Commercial Status, P-3 Disposition Ethics and Responsibility, P-4 Disposition of Live Monotremes, Marsupials, Small Insectivores, P-5 Euthanasia

New and Changed content released on July 2015

- V-7 Breeding/Contraception – section a.

MONOTREME, MARSUPIAL AND SMALL INSECTIVORE STANDARDS

GFAS notes that there may be other acceptable ways of meeting the intent of each standard, aside from those detailed below, and that in some instances there may be legal, cultural or other significant barriers to meeting GFAS requirements. The standards are considered mandatory, but GFAS will consider specific exceptions to some of the listed requirements (e.g., exact enclosure size, manner of record keeping, legal requirements that impact a sanctuary's acquisition policy, etc.). GFAS encourages sanctuaries to offer feedback on the standards and to explain any reasons why it believes it cannot meet a particular standard, or why the standard is not applicable and/or appropriate to its situation. Sanctuaries are also welcome to indicate a timeline for meeting a standard if the standard is not yet met at the time of application for accreditation or for verification.

The exceeding of the standards is encouraged. In addition to meeting these standards, an organization is expected to comply with all applicable international, national, state/province, and local laws and regulations.

MONOTREME, MARSUPIAL AND SMALL INSECTIVORE HOUSING

H-1. Types of Space and Size

Unless otherwise directed by a veterinarian, monotremes, marsupials and small insectivores are provided sufficient opportunity and space to move about freely and rapidly, and to exercise choice in location so as to reduce stress and maintain good physical condition.

General

- a. The habitat and living conditions are species appropriate and replicate, in as much as possible, the monotremes, marsupials and small insectivores' wild habitat with a balance between hygiene and the species' physiological and psychological needs. This includes adequate space, both vertical and horizontal, and appropriate space, in terms of diversity and complexity.
- b. The physical space provides varied opportunities for the monotremes, marsupials and small insectivores to interact with the environment and key elements are changed often, resulting in a dynamic living space.
- c. Facility design takes into account caregiver-animal safety and ease of maintaining a positive relationship.
- d. Monotremes, marsupials and small insectivores are provided access to as many areas of the enclosures as possible, except during staff maintenance activities, unless security concerns dictate otherwise. All enclosures interconnect without creating 'dead ends' to allow for freedom of movement of subordinate individuals.
- e. Outdoor enclosures are either covered, with minimum height to allow for natural behaviors, or open roofed, with cantilever angle or sufficient height to prevent escape (see Housing Dimensions for appropriate measurements).
- f. The habitat provides appropriate visual, olfactory, and acoustic barriers.
- g. The habitat provides security from predators and unauthorized human access.



- h. Ideally, housing requirements all include a double entry system so that there are two doors/barriers between the animals and escape at all times. The two doors/barriers are never open at the same time for the protection of sanctuary animals.

Open Space Settings

- i. Open space enclosures, which may be indoor or outdoor units, are designed to provide the maximum possible freedom and complexity for enclosure residents. The enclosures have sufficient area per animal to accommodate natural individual and group activities. While it may not be possible to monitor every animal in an Open Space enclosure on a daily basis, design allows for regular inspection of animals and facility maintenance as needed.
- j. Where open space settings are the primary enclosure, the following are also provided:
- Shelter which can serve as night housing and/or secure space during inclement and extreme weather.
 - Space for use while the primary enclosure is serviced and/or for animal management needs including introduction of new individuals to a group, or temporary separation for health or social reasons. (Note: This space might also be night housing, lockout, shift yard, transfer tunnels, etc.)
 - Alternate housing for sick or injured individuals.

Controlled access settings

- k. Controlled access enclosures, which may be indoor or outdoor units, provide sufficient space for natural activities but are also designed to allow caregivers to monitor each individual animal on a daily basis, to easily shift individuals, pairs or small groups as needed and to isolate animals for individual care. As with Open Space enclosures, design also includes:
- Shelter which can serve as night housing and/or secure space during inclement and extreme weather.
 - Space for use while the primary enclosure is serviced and/or for animal management needs including introduction of new individuals to a group, or temporary separation for health or social reasons. (Note: This space might also be night housing, lockout, shift yard, transfer tunnels, etc.)
 - Alternate housing for sick or injured individuals.

Indoor Housing

- l. Indoor housing provides year-round protection from the elements. For sanctuaries located in colder climates (where freezing temperatures occur regularly during any part of the year and temperate or tropical species are housed), indoor space is insulated and is large enough to allow for all forms of species-specific behavior (running, climbing, swimming, digging, playing, etc.).

Dimensions

- m. Many factors influence the minimum space required for a group of monotremes, marsupials and small insectivores, including, but not limited to: group size, group composition, and enclosure complexity. The following guidelines are minimum recommendations. Facilities should provide as much space as is possible and/or practical.
- n. Sanctuaries meeting only the minimum requirements for enclosure space employ additional environmental enrichment, focusing on physical and mental exercise rather than food, to compensate for reduced space and complexity.
- The use of a rotation system, which allows groups and/or individual monotremes, marsupials and small insectivores to regularly spend time in a larger or different space, is strongly encouraged in these circumstances to increase enrichment and encourage activity.
 - Outdoor enclosures for monotremes, marsupials and small insectivores-Enclosure shape may be variable to take in natural features in the landscape such as rock formations, hills and trees.

Particular attention is paid to providing hiding places, including access to indoor space, burrows, nests and plantings for security from predators. Space includes a minimum of one (1) animal transfer door leading to indoor shelter.

- Minimum of 3800 sq. ft. (350 sq. m) per pair of large macropods, with a minimum vertical dimension of 10 ft. (3 m) for either roofed or open top enclosure.
 - 81 sq. ft. (7.5 sq. m) per additional animal.
 - 1.7 ft. (0.5 m) overhang recommended for macropod enclosures.
- Minimum of 440 sq. ft. (40 sq. m) per pair of bilby, sloth, anteater, aardvark, small macropod and medium carnivorous marsupial species with minimum vertical dimension of 6.6 ft. (2 m) for either roofed or open top enclosure
 - 35 sq. ft. (3.2 sq. m) per additional animal.
 - 8 ft. (2.6 m) minimum vertical dimension for sloths.
- Minimum of 225 sq. ft. (20.9 sq. m) per compatible group of monotremes (generally no more than 3 animals) with minimum vertical dimension of 3.3 ft. (1m) for either roofed or open topped enclosures.
- Minimum of 161 sq. ft. (15 sq. m) per pair of small carnivorous marsupials, numbats, bandicoots, koala, possum, rat-kangaroo and glider with a minimum vertical dimension of 6.6 ft. (2 m) for either roofed or open top enclosure.
- Minimum of 140 sq. ft. (13 sq. m) per group of 10 small insectivores with a minimum 6.6 ft. (2 m) for either roofed or open top enclosures.
- Enclosures for macropods and bandicoots should be round, oval or randomly shaped to avoid tight corners or right angles to avoid animals becoming trapped or injured when startled.
- Includes water features for aquatic or semi-aquatic species:
 - Minimum of 65 sq. ft. (6 sq. m), 1.5 ft. (0.4 m) deep, for platypus.
 - Multiple waterbodies are included in each platypus group enclosure to accommodate natural solitary behavior.
- Indoor enclosures/shift yards for monotremes, marsupials and small insectivores- A minimum of two indoor areas or one indoor enclosure and one shift yard per compatible group of monotremes, marsupials or small insectivores with a minimum of two doors to adjacent enclosures, waterbodies and/or tunnels, as species appropriate. Room dimension is dependent on intended purpose and/or duration of confinement. Space includes pool or other water feature for aquatic or semi-aquatic species being housed long term. Shift yards, if utilized, are roofed or have mesh covering.
 - Minimum vertical dimension of 6 ft. (1.8 m) for most species, 8 ft. (2.4 m) for red kangaroo and sloths.
 - Includes two rooms or one room and a shift yard with minimum dimensions of 700 sq. ft. (65 sq.m) per pair of large macropods.
 - Includes two rooms or one room and a shift yard with minimum dimensions of 200 sq. ft. (18.6 sq. m) per pair of medium macropod, wombat, tree kangaroo or forest wallaby.
 - Includes two rooms or one room and a shift yard with minimum dimensions of 60 sq. ft. (5.5 sq. m) (1.8 m) per pair of compatible monotremes, sloths, aardvarks, anteaters, bilby, small macropod or medium carnivorous marsupial species.
 - An additional 10 sq. ft. (0.9 sq. m) per additional animal.
 - Includes one large nestbox per pair of adult monotremes.



- Includes one room with a minimum dimension of 20 sq. ft. (1.9 sq. m) per pair of small carnivorous marsupials, numbats, bandicoots, koala, possum, rat kangaroo, glider or per group of 10 small insectivores.
- Rooms and shift yards interconnect without creating 'dead ends' to allow for freedom of movement for subordinate individuals and include a minimum of two transfer doors per room/shift yard to the main outdoor enclosure.
- Where animals are housed indoors long term, e.g. in northern climates where freezing temperatures occur regularly, indoor space is large enough to accommodate all forms of species-specific behavior (running, jumping, hopping, burrowing, wading, swimming, climbing, etc.)
- Monotremes, marsupials and small insectivores may be familiarized with rooms and shift yards through routine feeding in or transfer through, or by being allowed continuous access.
- Whenever possible and species appropriate, separated animals have visual and tactile access to group members to facilitate reintroduction.

p. Mixed species housing

- Where multiple species share an enclosure, the total dimension is adjusted to reflect the minimum spatial requirements of each species housed.
- Minimum indoor dimensions remain unchanged for each species.
- Each species has a dedicated transfer door between indoor and outdoor enclosures.
- Mixed species groupings are appropriately researched to ensure compatibility and to avoid unnecessary stress for all species.

H-2. Containment

Monotremes, marsupials and small insectivores are safely contained.

General

- a. Other than when being transported or for medical reasons, monotremes, marsupials and small insectivores are kept at all times in secure enclosures or other appropriate areas.
- b. Enclosures are designed to allow for animals' normal defense reactions and appropriate 'flight' or escape distances.
- c. All enclosures are designed, constructed and maintained to securely contain monotremes, marsupials and small insectivores and to present no likelihood of harm to them.
- d. Distance or barriers between animals and between enclosures and personnel is sufficient to minimize stress to the animals, as well as reduce the risk of disease transmission.
 - Clear markings delineate safe zones or transparent barrier such as plexiglass or lexan is used in areas where caregivers must work in close proximity to cages.
- e. Enclosures are designed to allow for proper, safe cleaning and drainage.
- f. A regular program of sanctuary maintenance is in place.
- g. Materials are appropriate for their particular application and are maintained in good repair.

Outdoor Enclosures

- h. Perimeter containment of outdoor areas is constructed so as to prevent digging under the barrier by native wildlife, domestic species and the enclosure residents.



- i. Fences and enclosures are inspected daily for signs of digging. Where fencing meets hard surfaces such as rock or concrete, the fencing is securely anchored in place.
- j. Design takes into account climbing, digging, and other natural behaviors of species housed.

Fencing

- k. Barbed or razor wire are not used to contain monotremes, marsupials and small insectivores.
- l. The supporting posts for fences are firmly fixed into the ground.
- m. Fence material is sufficiently secured to supporting posts in such a way that the weight of the monotremes, marsupials or small insectivores could not detach it from the support nor dislodge the supporting posts.
- n. Gates and doors are at least as strong, and as effective, in containing the animals as the rest of the enclosure barriers. In particular gates and doors are designed and maintained so as to prevent animals from lifting them from their hinges or unfastening the securing device.
 - All containment barriers have a mechanism to prevent monotremes, marsupials and small insectivores from gaining access to dig under gates.
- o. Dimensions
 - Woven wire is recommended.
 - Maximum dimension of 2 in. x 2 in. (50.8 mm x 50.8 mm) for medium and large macropods, 1 in. x 1 in. (25.4 mm x 25.4 mm) for all other species.
 - Welded wire mesh is susceptible to breaks by large and medium macropods or local wildlife.
 - Chain link, if used, is constructed so that attachments do not protrude into enclosures and fencing is regularly checked for looseness and buckling.
 - Minimum vertical dimension of 6 ft. (1.8m) for roofed enclosures, 8 ft. (2.4 m) recommended for open top enclosures, particularly those housing arboreal, jumping or climbing species.
 - Upper 30% of barrier should be made of smooth, non-climbable material or cantilevered.

Electric Fencing

- p. Electric fence is not used to confine monotremes, marsupials and small insectivores but may be used as perimeter fencing to discourage predators.

Solid Barriers

- q. Solid barriers such as concrete block, poured concrete and artificial rock can be used as the sole method of containment or in conjunction with other types of barrier.
- r. Walls are secured in appropriate footings to ensure wall stability, and are of sufficient strength to anchor caging and furniture.
- s. Care is taken, especially with artificial rock, to ensure that contours in the rock do not provide escape routes from the enclosure.
- t. Height of the wall is the same as that for fences.
- u. Design of areas using solid walls allows for sufficient air flow throughout an enclosure.

Moats

- v. Moats are not recommended for containment of monotremes, marsupials and small insectivores.

Indoor Enclosures and Shift Yards

- w. Mesh or solid walls may be used for construction of indoor enclosures and shift yards. Where mesh is used, size recommendations are the same as for outdoor enclosures.



- x. Shift yards are topped with mesh or roofing due to their small size, which increases the possibility of escapes.
- y. Walls are of sufficient strength to anchor caging and furniture.

H-3. Ground and Plantings

Ground cover indoors and out is healthy for monotremes, marsupials and small insectivores. Plantings are appropriate and safe.

Vegetation

- a. Any vegetation capable of harming monotremes, marsupials and small insectivores is kept out of reach.
- b. Trees within or near animal enclosures are regularly inspected, trimmed or felled as necessary to avoid animals being harmed by falling branches, toxicity, or trauma.
- c. Trees and climbing plants are pruned to prevent their aiding animal escape.
- d. Access to very tall trees which are useful for shade limited by electric wires, barriers etc. to prevent their aiding animal escape.
- e. Any natural materials (e.g., plants and their products, such as seeds or fruit) are assessed for toxicity to the species held before use.

Outdoor enclosures

- f. All outdoor enclosures have a natural substrate consistent with the needs of the species.
 - The substrate provides easy to clean, dry areas for ground feeding and digging.
 - The substrate can be amended with organic materials, including but not limited to soils, sand, leaf litter, bark mulch, grasses, straw and hay.
 - Leaf litter is not used in wombat enclosures to reduce risk of fungal infections of the feet.
 - Sand is recommended in dasyurid (mulgara, kultarr, etc.) enclosures.
 - Substrate is provided in sufficient amount/depth to cushion falls from climbing structures, where species appropriate.
 - The substrate drains well.
- g. Monotremes, marsupials and small insectivores are provided with species appropriate environments to accommodate an array of locomotory and foraging behaviors, as well as appropriate sleeping and resting areas, including nesting and bedding materials.
 - Arboreal species are provided with sleeping and resting areas, with bedding and nesting materials, above ground.
 - Trees in koala enclosures provide at least 2 appropriately sized forks for each animal a minimum of 6 ft. (1.8 m) above ground.
 - Trees should be 3 ft. (1m) to 6.5 ft. (2 m) apart to allow for koalas to move from tree to tree.
 - Forks are separated from each other by at least 3 ft. (0.9m).
- h. Natural areas for burrowing are provided as species appropriate. Where this is not possible, artificial tunnels of appropriate size and complexity for the species housed are created.
 - Artificial tunnels are a minimum of 6 in. x 6 in. (15 cm x 15 cm)



- i. Aquatic and semi-aquatic species are provided with appropriate water sources and water quality is monitored where water sources are not 'dump and fill'.
 - Water features are designed such that animals are not at risk of being unable to safely enter and exit the water and are of a species appropriate depth.
 - Platypus are provided with tunnel access, in addition to above ground access into their water features.
- j. Where natural topography of an enclosure is not varied, it is created through the addition of natural and placed elements.
 - Horizontal and vertical jump or 'gliding' distance is considered when developing enclosure topography.

Indoor enclosures

- k. Indoor enclosures have a non-slip concrete floor and, provided adequate septic service is present, the floor is sloped to a drain. Natural substrate, which is routinely replaced, is used as species appropriate.
 - Wombats should be provided with soil or sand to a depth of 1.6 ft. (0.5 m) to 3.3 ft. (1m) to allow for normal burrowing behavior.
 - Arboreal species have access to above ground perching, foraging and resting areas.
 - Bandicoots and rat kangaroos have access to dense vegetation or other means for hiding.
 - In terrestrial marsupial and monotreme enclosures rubber mats may be used to provide traction and reduce risk of pressure sores.
 - Easily cleanable flooring other than concrete may be considered for these species.
- l. For new construction, the indoor area is designed to accommodate a deep litter substrate for monotremes, dasyurids and small insectivores.
 - Deep litter enclosures are designed to allow appropriate litter depth and drainage for proper functioning.
 - Litter is properly spot-cleaned and maintained.
- m. Existing construction ensures that all floors are sealed.
- n. Bedding materials are provided in sufficient amount/depth to prevent contact with the concrete.
 - Bedding material suitable for use includes, but is not limited to, bark mulch, leaf litter, wood wool, straw hay, shredded paper and wood shavings.
 - Leaf litter is not used for wombats.
 - Sand is recommended for dasyurids.
- o. Aquatic and semi-aquatic species are provided with water sources when climate requires them to be housed indoors for extended periods.
- p. All animals are observed regularly for signs of illness that may be related to ingestion of foreign objects, including wood shavings, bark mulch or other materials that may pose a hazard.

Shift yards

- q. All outdoor shift yards have a minimum of 50% of the surface area in natural substrate. The remaining 50% may be concrete as appropriate for drainage, sanitation and structural needs.
- r. The substrate can be amended with organic materials including, but not limited to, soils, sand, leaf litter, bark mulch, grasses, straw and hay, as species appropriate. The substrate drains well.

- s. Bedding materials are provided in sufficient amount/depth to prevent direct contact with any concrete surfaces.
- t. Appropriately sized trees, branchwork or climbing structures are provided for arboreal species.
- u. Dense vegetation or other means for hiding are provided for bandicoots and rat kangaroos.
- v. Shift yards are secured with buried fencing or a poured concrete pad or apron.
- w. Shift yards which house aquatic and semi-aquatic species for extended periods include a species appropriate water features.

H-4. Transfer Doors

Monotreme, marsupial and small insectivore transfer doors are appropriately designed to ensure both animal and human health and safety.

General

- a. Animal transfer doors are a key element of facility design.
- b. Doors are designed to allow transport crates to safely attach to them.
 - Transport crates should be able to be moved in and out of the enclosure through the transfer doors.
- c. Transfer doors are designed to remain functional under all circumstances, are maintained in good working order and free from any encumbrances that may prevent opening and closing.
- d. Doors are designed to allow caregiver view of enclosures while operating the doors.
- e. Minimum dimensions of transfer doors are such that the largest animals in the enclosure can maintain normal posture when passing through the opening.
- f. Doors are designed such that people are out of view when animals are being shifted. If not, no eye contact is made with the animals going through the doors.
- g. Doors and door hardware are properly maintained to ensure proper functioning.

Security

- h. Transfer doors and their frames are constructed of materials similar in strength to those used in the primary enclosure.
- i. Doors are lockable in both the open and closed positions.
- j. For pneumatic or hydraulic doors, pneumatic or hydraulic pressure is sufficient for keeping doors in the open position. A mechanical lock is, however, in place to lock the door in the closed position.
- k. Particular attention is given to preventing hay/shavings from affecting door mechanisms.

Animal Safety

- l. Doors operated via remote control are visible from the control area.
- m. Guillotine doors are not recommended due to risk of animal injury. If used, a backup system should be in place to prevent door from free falling due to mechanical failure or operator error.
- n. Hydraulic systems use peanut or other food-grade oils to prevent risks to the monotremes, marsupials and small insectivores in the event of leakage.
- o. Hydraulic and pneumatic door systems include backup systems to allow for door usage in the event of equipment failure.

User Safety

- p. If door handles or locking mechanisms are in close proximity to the enclosure, a solid barrier is present to protect the user.
- q. Double door systems may be used to prevent monotreme, marsupial and small insectivore escape from holding areas.

H-5. Shelter

Monotremes, marsupials and small insectivores have access to man-made shelter that provides each individual with protection from extreme weather (including, but not limited to, prevailing wind, snow, sleet, rain, sun, and temperature extremes).

- a. Monotremes, marsupials and small insectivores have space to seek refuge from sun, wind, inclement weather and enclosure mates.
- b. Shelter does not create or result in 'dead ends' in which individuals can be trapped by other group members.
- c. Shade and shelter are provided in multiple locations within enclosures to ensure that all animals have access throughout the day.
- d. Shade and shelter can be created through natural and artificial means including hollow logs, rock overhangs, underground dens, shade trees and shade fabric.
- e. Shelter areas provide dry space during wet weather, as well as protection from wind.
- f. Shelter design does not result in dead ends in which subordinate individuals can be trapped by dominant animals.

H-6. Enclosure Furniture

Monotremes, marsupials and small insectivores are provided with an appropriately complex and rich habitat to explore, to ensure the animals' physical, nutritional and stimulation needs are met.

General

- a. Enclosures are equipped in accordance with the needs of the monotremes, marsupials and small insectivores with bedding material, water features, nesting or hide boxes, tunnels, appropriate substrate, vegetation and other enrichment materials designed to aid and encourage normal behavior patterns and minimize any abnormal behavior.
- b. Appropriate complexity is provided through the use of various natural and artificial materials in the enclosure, using a combination of items including, but not limited to, those listed above.
- c. The date that items are placed in an enclosure is noted, and items are removed when they become soiled, damaged or novelty has diminished.
- d. Enclosure furnishings for monotremes are chosen to be as non-abrasive as possible.
- e. Climbing species are provided access to the vertical space available within the enclosures.
- f. Ground dwelling and tunneling species have access to areas for digging/tunneling and/or are provided with artificial tunnels and nest/hide boxes as species appropriate



- g. Aquatic species have access to species appropriate water features.

Outdoor Enclosures

- h. Visual barriers can be used to avoid confrontation or aggression, and include climbing structures, fallen logs, natural or artificial tunnels, walls, shade structures, topography and large enrichment items.
- Logs are placed and secured in a manner that prevents rolling or falling onto animals.
 - Nest boxes, dense vegetation and/or other hiding places are provided, as species appropriate.
- i. Burrowing/tunneling sites are provided, as species appropriate, along with suitable nesting materials.
- Where this is not possible, artificial tunnels of pvc pipe or similar are provided.
- j. Climbing structures accommodate natural locomotion patterns where species appropriate natural climbing opportunities are not present. When multiple species are housed together, climbing structures created specifically for each species' unique needs are provided. Metal pipe is not used to construct climbers as it becomes dangerously hot in summer sun and can damage skin during cold weather. Climbing structures should be accessible by staff for routine sanitation, repairs and updates and should include:
- horizontal and vertical elements
 - locations and/or mechanisms to provide enrichment above ground level
 - resting/perching platforms
 - soft substrate such as soil, bedding material, mulch or leaf litter installed below climbers to minimize risk of injuries from falls, especially to youngsters and older individuals.
- k. Water sources such as pools, streams or ponds are provided as species appropriate. Permanent pool structures, where present, have an adequate filtration system to maintain institutional water quality parameters or are designed to allow easy draining, cleaning and refilling at suitable intervals to ensure water remains potable.
- Roots, trees and stumps on shore and in the water provide additional enrichment for aquatic/semi-aquatic species.
 - Multiple pools at least 64.5 sq. ft. (6 sq. m) across and 1.3 ft. (0.4 m) deep with sloping sides is recommended for playpus enclosures.
 - In excessive heat, fountains and misters may also be used to cool the air.

Species Specific Enclosure Furnishing Recommendations

- l. Branches in monotreme enclosures are weathered or soaked to remove tanins.
- m. Small insectivores are provided with decaying logs, which are likely to have insects within them.
- n. Wombats and platypus are provided with nest boxes, large rocks and hollow logs
- o. Where possible, kultarrs are provided with highly scented branches such as eucalyptus weekly for new scent sources.
- p. Wallabies are provided with tussocks or other nesting materials to encourage them to create natural hip holes.
- q. Swamp wallabies are provided with a water source or multiple sprinklers.
- r. Multiple nest boxes per animal are provided for denning and tree nesting species.

Indoor Enclosures/Shift Yards

- s. To the greatest extent possible, all visual barriers, digging/tunneling spaces, nest boxes, water features and climbing structures meet outdoor enclosure criteria, particularly where monotremes,



marsupials and small insectivores must be housed in these limited spaces for extended periods of time.

- t. Indoor furniture is constructed of materials that can be sanitized or easily replaced when they become overly soiled. Furniture is accessible to staff for routine cleaning and repair.
- u. Benches and other structures allow for climbing and for sleeping above ground level as species appropriate.
- v. Dens and water features are provided, as species appropriate.

H-7. Sanitation

Proper sanitation is practiced to reduce pathogen transmission.

General

- a. Local, county, state laws regarding proper waste removal are observed.
- b. Where possible, monotremes, marsupials and small insectivores are transferred from enclosures prior to cleaning, disinfection and/or sanitizing.
- c. Enclosures are designed to promote sanitation and maintenance as appropriate for the health and well-being of the animals housed, without resulting in undue disturbance or stress.
- d. As fomites (shoes, clothing, etc. which carry infectious materials) may be a source of zoonotic disease, all who may come in contact with such materials are made aware of these risks and trained accordingly. (See also Standard V-8, “Zoonotic Disease Program”).
- e. Uneaten perishable food is removed within a timeframe appropriate for the type of foodstuff and size of enclosure, prior to molding or contamination.

Removal of Animal Waste

- f. Animal waste is removed from the habitat as often as necessary to prevent contamination of the animals contained therein, to minimize disease hazards and to reduce odors. This also enables caregivers to collect fecal samples in a timely manner.
- g. Soiled bedding material and substrate are removed and replaced with fresh materials daily, or as needed to prevent buildup. If odorous, bedding is changed regardless of how long in place, taking into account the social aspects of olfactory cues where species appropriate.
- h. Damaged and soiled enrichment items are removed regularly.
- i. Efforts are made to prevent native wildlife getting access to waste.

Tools

- j. Each enclosure has dedicated tools to prevent cross contamination between enclosures. When resources restrict the ability to have dedicated tools, tools are disinfected between enclosures to prevent the spread of parasites and disease.
- k. Tools are labeled when use is restricted to specific areas.
- l. Sanitation tools or equipment, including wheelbarrows, are not used for transport or storage of foodstuffs or bedding.

Cleaning and Disinfection

- m. Feeding areas, automatic water devices, water and food containers are cleaned and disinfected daily.



- n. Care is taken to minimize overspray of waste, directly or via aerosolizing, into adjacent cages during cleaning.
- o. Animals are not present in enclosures being cleaned using power hoses. Care is taken to prevent accidental spraying of animals in adjacent enclosures when power hoses are used for cleaning.
- p. Concrete floored enclosures are dried with a squeegee, and as needed fans, to ensure floors are dry before bedding material is replaced.
- q. All hard surfaces including walls, floors, ceiling, benches, climbing structures, cage mesh and caregiver work areas are sanitized regularly to the extent possible. Note that in large outside enclosures with plenty of exposure to sunshine and rain, there may not be a need for scrubbing and cleaning but areas must be monitored for potential sanitation problems.
- r. Cleaning and Disinfection Standard Operating Procedures are developed and followed to address:
 - safe disinfectant use to prevent hazards to the animals, caregivers and the environment;
 - cleaning and disinfecting protocols for food preparation and veterinary care areas using more powerful disinfectants on hard surfaces;
 - daily, weekly, monthly and quarterly cleaning schedules for all hard surfaces including walls, floors, ceiling, benches, cage mesh and staff work areas designed to minimize the risk of disease transmission;
 - disinfectants and other cleaning products stored separately from foodstuffs.
- s. A Material Safety Data Sheet (MSDS) or equivalent is readily available for all cleaning products in use and all containers are properly labeled as to contents.

H-8. Temperature, Humidity, Ventilation, Lighting

Temperature, humidity, ventilation, and lighting are appropriately addressed.

Temperature

- a. The temperature is within an acceptable range for the species housed.
 - Weather is considered in addition to temperature.
 - Allowance is made to accommodate individual animals not able to tolerate temperatures above or below the usual range of comfort for the species.
- b. For outdoor enclosures and shift yards, in general, monotremes, marsupials and small insectivores have access to heated or cooled areas when ambient temperature falls below 50°F (10°C), adjusted for wind chill, or rises above 77° F (25°C) and are provided with dry, well-bedded resting space. Great caution is taken with elderly, infant and disabled animals. Species which depend on evaporative cooling, such as koala, are provided with misters as a cooling source.
 - Monotremes are at risk of heat stress when temperatures risk above 90°F (32°C).
 - Access to water sources or cooling devices is provided when temperatures approach 86°F (30°C).
 - Boreal hedgehog species may tolerate lower temperatures and tropical species may tolerate higher.
 - Sloths and anteaters are protected from extremes of, and sudden changes in, temperature.
 - Gliders are provided with heat sources when temperatures fall below 41°F (5°C)
 - Wallabies are provided with cooling sources when temperatures rise above 86°F (30°C).

- Swamp wallabies may be provided with water sources which allow them to stand or dangle their forearms in the water.
 - Tree kangaroos are maintained at temperatures between 65°F (18°C) and 72°F (22°C).
 - Brushtail possums are maintained at temperatures between 65°F (18°C) and 95°F (35°C).
 - Tasmanian devils are maintained at temperatures between 59°F (15°C) and 77°F (25°C).
 - Misters or water sources for wading are recommended when cooling is required.
 - Wombats are best maintained at temperatures between 50°F (10°C) and 81°F (27°C).
 - Higher temperatures can be tolerated when animals have access to cooler burrows.
 - Aardvarks are provided with heat sources when temperatures fall below 60°F (16°C) with den temperatures maintained at 72°F (22°C).
 - Bandicoot are maintained at temperatures between 66°F (19°C) and 77°F (25°C).
 - Rat kangaroos, including potoroo are maintained at temperatures between 41°F (5°C) and 95°F (35°C) with an average temperature of 77°F (25°C) being ideal.
 - Kultarr are maintained at temperatures between 66°F (19°C) and 72°F (22°C).
 - Mulgara are maintained at temperatures between 72°F (22°C) and 81°F (27°C)
 - Access to 150W infrared basking lamps for several hours each day is recommended when kultarr and mulgara have limited access to sunlight.
 - Animals are able to move away from the lamps and have constant access to water sources to prevent dehydration.
 - Windbreaks are sufficient in number to accommodate all animals simultaneously with consideration for social structure and relationships in a group.
 - Shade is available throughout the day in a number of areas and adequate size space to accommodate all animals simultaneously with consideration for social structure and relationships within a group.
 - Care is taken to prevent direct animal contact with heat sources. Note: Infrared bulbs or 'heat lamps' are not recommended as heat sources due to risks associated with bulb breakage and tissue damage to animals.
 - Heating blocks/panels, if used, are installed and used so as to ensure they pose no risk to the animals.
- c. For temperatures outside recommended ranges heat can be provided by forced air or hydronic heating systems and cool air by refrigerant air conditioning, "swamp coolers", fans, or misters;
- Providing animals with opportunities to choose temperature ranges within an enclosure is preferred. This can be achieved by access to areas near heat vents, skylights, or hog warmers for example.
 - Even when ambient temperatures are 'warm', bare concrete floors, especially damp floors, are too cold for many individuals and are not considered suitable substrate or housing for monotremes, marsupials and small insectivores.
 - Den/nest areas are provided for all animals, as species appropriate, in indoor enclosures.
 - Any climate control systems include back-up power in case of equipment or power failure.

Humidity

- d. Optimal indoor humidity is between 40% and 70%. Humidity should not be kept above 80% in controlled environments to prevent fungal and mold growth. High humidity can be mitigated through proper ventilation or dehumidifier systems.



- Lower humidity is better tolerated by desert species.
- Wombats are ideally maintained at 60–70% humidity but can tolerate lower humidity if provided with burrows which provide higher humidity.
- Tree kangaroos are ideally maintained at humidity levels above 50% to reduce the risk of dry skin problems.

Ventilation

- e. Proper ventilation of indoor enclosures is critical.
 - In these areas, Heat Recovery Ventilators and Energy Recovery Ventilators can provide fresh outdoor air with minimal heat loss.
- f. Indoor enclosures ideally have a negative air pressure, with regular exchange of non-re-circulated air.
 - A minimum of one complete air exchange per hour is recommended.
 - Where negative air pressure is not used, HEPA filters may be installed to maintain re-circulated air quality.
- g. To the extent possible, separate air handling systems are maintained between animal areas to prevent disease transmission.
- h. Proper window and door placement can ensure sufficient cross-ventilation in warm climates.

Lighting

- i. Light, natural and artificial, is appropriate for the species housed in terms of intensity, spectrum and duration.
- j. Indoor enclosures - Natural lighting is optimal and can be obtained using skylights, windows, roll-up doors and other means. Glass bricks may be considered, taking into account the fact that light intensity will be less than with clear glass.
 - Supplemental lighting is provided to ensure adequate light, both day and night, for caregivers to observe animals, clean enclosures and perform related animal care tasks.
 - When animals are confined indoors overnight, sufficient lighting is used to extend the daylight period to a natural diurnal rhythm for the species housed to allow animals time to eat and select sleeping sites.
 - For nocturnal species, attention is paid to ensuring sufficient hours without artificial illumination.
- k. Outdoor enclosures and shift yards - Supplemental lighting is available for use in outdoor areas in event of an emergency.

NUTRITION REQUIREMENTS

N-1. Water

Fresh clean water is available in sufficient quantity.

Quantity

- a. Fresh clean water is available at all times to all individuals.
- b. Multiple water sources are available for group-housed monotremes, marsupials and small insectivores to ensure high-ranking individuals do not dominate water sources.



Quality

- c. Water quality parameters are maintained at a generally acceptable level for monotremes, marsupials and small insectivores in terms of turbidity, salts, etc.
- d. Potable water sources are tested for contaminants annually.
- e. All water sources (including water bowls, bottles, tubs and lixits) are cleaned at least daily, and more often if needed.
- f. If automatic water devices are not used in hot climates, water sources are shaded or changed multiple times to avoid overly hot water.
- g. If automatic water devices are not used, care is taken to ensure bowls are secured such that the animals cannot tip them over, play with them or hide them from view and that water is available at all times.

Automatic Water Devices

- h. Devices are tested daily to ensure water is available.
- i. Devices are easily disabled when animals must be fasted for medical purposes.
- j. When monitoring of water consumption is required, an alternative means of providing water is devised.
- k. In colder climates, steps are taken (such as installation of heat sources) to ensure water consumption does not decrease with lower ambient air temperatures.

N-2. Diet

A properly balanced and healthy diet is provided appropriately based on the needs of each monotreme, marsupial and small insectivore following veterinary instructions for special needs.

General

- a. A veterinarian or qualified nutritionist periodically reviews all aspects of monotreme, marsupial and small insectivore diet at the sanctuary.
- b. Diets of individual animals (including vitamin supplementation) are of a quality, quantity and variety to match the physiological and psychological state of the individual as it changes over time, with consideration for the age, life stage, species, condition, and size of the individual.
- c. Food is wholesome, palatable, free from contamination and of sufficient quantity and nutritive value to maintain all monotremes, marsupials and small insectivores in good health.
- d. The sanctuary utilizes a feeding regimen that ensures each individual receives adequate nutrition regardless of status in social group.
- e. Where possible and appropriate, each animal's daily dietary needs are documented and made available to animal care staff.
- f. In open space enclosures, routine observation of feeding activity ensures all animals are able to access sufficient food.
- g. Other than commercial diets prepared specifically for monotremes, marsupials and small insectivores, only food "fit for human consumption" is fed.

Commercially Prepared Complete Feeds

- h. While the basic nutritional needs of most monotreme, marsupial and small insectivore species may be met by the use of a high quality commercially prepared complete feed, most species' behavioral and foraging needs are not met using such diets alone. When combined with fruits, vegetables, browse, animal protein and other whole foods, these diets can help ensure balanced nutrition.
 - High quality herbivore complete feeds may serve as the core of marsupial diets
 - Insectivores, other than sloths, may be fed a balanced, low fat commercial dog or cat diet.
 - Anteaters may be fed a combination of commercial cat food and primate or insectivore complete feed when supplemented with fruit and vegetables.

Animal Protein

- i. Commercially available insects including crickets, mealworms and waxworms form the basis for insectivore, carnivorous marsupial and echidna diets and may be used as part of the diet, when combined with the items listed below, of platypus.
- j. Animals in outdoor enclosures on natural substrate may consume naturally occurring insects.
 - The use of pesticides near enclosures takes this into account.
- k. Fish and freshwater shrimp are a regular part of platypus basic diet.
- l. Insectivores may occasionally be fed small amounts of eggs or cheese but careful attention is paid to maintaining proper calcium:phosphorus ratio in the overall diet.
- m. Carnivorous marsupials may be offered small rodents and birds as part of a balanced diet.



- n. Sloth diets include protein sources such as eggs and insects.
- o. Bones, eggs and various meat sources, such as rabbit and other mammals, are routinely fed to Tasmanian devils and quolls.
 - Feeding of whole carcasses to groups of Tasmanian devils is recommended to promote natural social behavior.

Vegetables and Fruits

- p. A variety of leafy greens, vegetables and fruit are offered as species appropriate as a component of the basic diet.
 - Possum and tree and rat kangaroos, in particular, benefit from a varied vegetable and fruit component in their diet.
- q. Sloth diets include regular portions of fruit.
- r. Anteaters are offered fruits and vegetables including avocado, where available, as part of their overall diet.
- s. Pygmy possum, which are primarily nectivores, are provided with fresh flowers and/or nectar mix to supplement their basic diet.

Browse

- t. Koalas are entirely dependent on eucalyptus leaves for nutrition.
 - Seasonally appropriate species and types of eucalyptus are provided for these animals, based on the individual animal's condition.
 - Whole branches of a variety of species are offered and replaced daily.
- u. Leaves, twigs, shoots and buds are provided as a main component of sloth diets.
- v. Herbivorous marsupials are offered fresh cut plant material daily, particularly for those animals housed indoors with no access to natural browse. Seeds are not offered to reduce the risk of disease.

Diet for Most Insectivores and Opossum

- w. Low calorie, high quality dog or cat diets, fruits, vegetables, insects, cottage cheese or eggs.
 - Due to a tendency toward obesity in captivity cheese and or eggs are fed only in small quantities.
 - Tenrecs are not offered citrus fruit.
 - See Animal Protein and Complete Feed sections for anteater dietary needs.

Vitamins/Supplements

- x. Prior to offering supplemental vitamins, the health and condition of the individual animal, as well as the diet, is reviewed by a nutritionist experienced in monotreme, marsupial and small insectivore care and/or the attending veterinarian.
- y. Mineral blocks may be needed for tree kangaroos and grazing marsupials kept largely on pasture following veterinarian or nutritionist recommendations based on the individual animals housed, local conditions and pasture type.

Treats/Enrichment items

- z. Preferred food items from the basic diet can be reserved for enrichment.
- aa. The calories in foods used as enrichment are considered when planning the overall diet.

N-3. Food Presentation and Feeding Techniques

Food is prepared and presented in a safe and appropriate manner to meet monotreme, marsupial, and small insectivore health and social needs.

General

- a. Feeding and drinking receptacles are placed in positions that minimize the risks of contamination from soiling by the monotremes, marsupials and small insectivores themselves, wild birds, non-resident rodents and other potentially invasive species.
- b. Food receptacles, where used, are appropriate for the species housed in terms of number, size and placement, and are cleaned daily.
- c. Receptacles for animal food and water are designed to minimize spillage and are not used for any other purpose.
- d. Monotremes, marsupials and small insectivores are offered food a minimum of once daily during the active feeding time of the species housed. For most species, at least two feedings are recommended.
 - If fed once daily, items are of sufficient quantity and quality to ensure that animals have the opportunity to feed several times throughout the day.
 - Nocturnal species are fed late in the day to ensure freshness of food during normal feeding hours.
 - Single feeding regimens are carefully monitored and reviewed frequently to ensure they meet the nutritional and psychological needs of the species housed.

Feeding Techniques

- e. Food is provisioned at multiple feeding sites throughout enclosures to ensure all animals have access and to reduce or eliminate aggression that results from competition for food resources, especially preferred items.
 - Arboreal species are fed above ground, as species appropriate.
- f. Food may be offered in shift yards and indoor areas to increase monotreme, marsupial and small insectivore comfort with those areas and improve reliability in transferring from one area to another.

Diet Changes, Increases or Decreases

- g. Adjustments made to an already formulated and nutritionally balanced diet are made to the entire diet to ensure continued nutritional balance.
- h. Considerations for diet increase include weight and condition of the animal, food consumption, season, activity level and other medical or behavioral considerations.
- i. Diet increases or decreases are made in modest increments with animal response to the change assessed for a minimum period before additional changes are made.
- j. Underweight individuals experiencing health or behavioral problems may be separated for supplemental feeding as needed to avoid undesirable weight gain in conspecifics.

N-4. Food Storage

Food is stored appropriately.



General

- a. Separate and secure facilities are provided for proper and hygienic storage of food.
- b. Dry goods are stored in clean, dry storage areas in sealed containers or on pallets. Products are dated and rotated to use oldest stock first and expired food, as well as bags damaged by pests, are discarded.
- c. Perishable foods are kept under refrigeration and ordered in increments that can be used prior to spoilage.
- d. Items frozen for use are dated and labeled, and no frozen items are thawed and refrozen. Items that are not fed frozen are thawed in a refrigerator to minimize risk of spoilage. Fish may be thawed in cold water.

N-5. Food Handling

Food is handled and prepared in an appropriate manner to retain nutritional value, freshness, and freedom from spoilage, invasive species or other forms of contamination.

General

- a. Food is protected against dampness, deterioration, mold, and/or contamination by insects, birds, rodents or other animals.
- b. No food that is spoiled or otherwise contaminated is served.
- c. Diets are prepared in a safe and hygienic manner to reduce the possibility of contamination or spoilage.
- d. Separate cutting boards, utensils and food preparation surfaces are used when meats, fish and produce diets are prepared in a common kitchen area.
- e. Food preparation techniques meet all local, state/province, and national regulations.
- f. Food preparation surfaces are thoroughly cleaned after use.
- g. Staff and volunteers wash hands thoroughly prior to handling food, and wearing gloves during food preparation is recommended.

Veterinary Care

V-1. General Medical Program and Staffing

There is a written veterinary medical program, overseen by a veterinarian, with adequate support staff at the Sanctuary, with 24/7 veterinary care available on call.

- a. The sanctuary has a written veterinary medical program, including long term preventative medical protocols and disease surveillance and containment procedures, that is developed and carried out under the supervision of a licensed veterinarian – the attending veterinarian - who has training or experience in providing medical care for the monotremes, marsupials and small insectivores, and other species housed at the sanctuary, and who is aware of specific health concerns regarding the monotremes, marsupials and small insectivores housed at the sanctuary.



- b. One or more full-time veterinarians specifically concerned with the veterinary medical program is highly recommended for sanctuaries whose budget will support the salaries of such trained personnel. Sanctuaries unable to employ a full-time veterinarian have access to a part-time veterinarian, under a contractual or other similar arrangement, with training and appropriate experience with the monotremes, marsupials and small insectivores housed at the sanctuary.
- c. Veterinary care is available 7 days per week and 24 hours per day for the sanctuary on an on-call basis when a veterinarian is not physically on grounds. When the primary veterinarian is unavailable, there are other suitably experienced veterinarians on call.
- d. There are support staff to carry out the following roles: (1) Husbandry (monotreme, marsupial and small insectivore caregivers), (2) Technical (medical technologists, veterinary nurses, or individuals trained at the sanctuary), and (3) Clerical. The sanctuary has available properly trained and qualified professional and supporting personnel as necessary to implement these roles.
- e. A staff member is trained to serve as a medical program director, dealing with emergencies until a veterinarian arrives or is reached. He or she is able to direct any restraint of the monotremes, marsupials and small insectivores, be responsible for administration of post-surgical care, and be skilled in maintaining appropriate medical records.
- f. Medications are stored appropriately on site, according to label directions. Medications requiring refrigeration are stored separately from food items.

V-2. On-Site and Off-Site Veterinary Facilities

Veterinary facilities are appropriately located, designed and equipped.

- a. Any on-site veterinary facility at the sanctuary meets all local and state/province building regulations
- b. Surfaces in the on-site veterinary facility with which monotremes, marsupials and small insectivores can come in contact are non-toxic and can be readily disinfected.
- c. The on-site facility is located away from areas of heavy public use to minimize the noise levels for hospitalized monotremes, marsupials and small insectivores.
- d. The on-site facility has separate areas for any of the following veterinary functions performed on-site: physical examinations and medical treatments, enclosures for hospitalized animals, sterile surgery, necropsy, medical quarantine, laboratory, radiology and pharmaceuticals storage which includes, when necessary, a safe for narcotics that meets the standards set by applicable regulations (e.g., the Drug Enforcement Administration [DEA] in the United States).
 - Food preparation areas, storage areas and staff locker room/housing with showers are separate from the medical facility.
- e. If the sanctuary does not have an on-site veterinary facility, or only a partially outfitted veterinary facility it has a contract or similar arrangement with a nearby veterinary hospital for off-site treatment as needed. The hospital should have a sterile surgical facility with anesthetic equipment to include radiology equipment, a laboratory, and pharmaceutical storage. If necropsies are performed at the hospital, there is a separate area for necropsies and a separate storage refrigerator for storage of carcasses.
- f. See also Standard V-4 "Clinical Pathology, Surgical, Treatment and Necropsy Facilities."

V-3. Preventative Medicine Program

The sanctuary has a complete preventative medicine program.



- a. Appropriate preventative medicine programs are in place to manage all monotremes, marsupials and small insectivores, with special attention paid to geriatric animals.
- b. The preventative medicine program includes quarantine procedures, parasite surveillance and control, immunization, contraception, infectious diseases screening, dental prophylaxis, and periodic reviews of diets, husbandry techniques and invasive species control.
- c. When circumstances permit, and as appropriate for the individual animal, an overall examination is performed annually, blood is collected, serum banked as a baseline control and the results are recorded. The attending veterinarian, in consultation with the sanctuary director, determines any schedule for routine physical examinations, including ocular, dental and musculoskeletal assessment, and implements any necessary treatment.
- d. A veterinarian, veterinary technician, or other trained person performs regular fecal examinations to look for parasites and other pathogens (random enclosure sampling is adequate for group-housed monotremes, marsupials and small insectivores). Results are recorded. Fecal examinations are repeated following treatment to evaluate efficacy.
- e. All monotremes, marsupials and small insectivores are immunized as recommended by the attending veterinarian, using currently recommended procedures and products as appropriate for the country, species and individual. Where possible, killed vaccines are utilized to minimize the potential for adverse reactions. Schedules and products are dictated by the disease status of domestic and wild animals in the area surrounding the sanctuary and relevant local and national laws.
- f. When monotremes, marsupials and small insectivores are immunized, the type, serial number, and source of product are recorded in the individual animal's medical record.

V-4. Clinical Pathology, Surgical, Treatment and Necropsy Facilities

Clinical pathology, surgical facilities and services, medical treatment for sanctuary monotremes, marsupials and small insectivores and necropsy are all high quality, humane, professional, legal, and safe.

Clinical Pathology

- a. Diagnostic laboratory services are available on- or off-site to assist with the examination of monotremes, marsupials and small insectivores and the diagnosis of disease.
- b. Diagnostic capabilities include radiology, cytology, microbiology, parasitology, complete blood count, blood chemistry, urinalysis, serology and other appropriate laboratory procedures.

Surgical

- c. The sanctuary has access to surgical facilities (either on-site or at a nearby veterinary hospital) that are clean, free from excessive noise and unnecessary pedestrian traffic, have adequate lighting, ventilation, and temperature controls, and that can be easily cleaned and disinfected. For sanctuaries utilizing off-site aseptic surgical facilities, an on-site area that can be adapted for occasional or emergency aseptic surgical use is available.
- d. Surgical facilities have access to appropriate anesthetics including injectable and inhalant anesthetics, reversal agents, etc. Where gas anesthetic equipment, including scavenger units, is used equipment is cleaned and calibrated and filters are replaced, annually at a minimum. Gas cylinders are safely stored and replaced regularly.
- e. Facilities have sterilized surgical packs, surgical preparation solutions, intravenous fluids, fluid administration equipment, pulse oximetry, heart monitoring equipment (e.g. electrocardiogram, stethoscope), and emergency drugs on-site with appropriate maintenance and/or replacement schedules for each.



- f. If on-site, the sanctuary ensures that surgical equipment is maintained in good working order and is on a program of routine preventive maintenance.
- g. Only a licensed veterinarian performs surgery, using standard operating procedures. (Note: A veterinary technician appropriately trained by a veterinarian in states or provinces where such action is permitted by veterinary practice acts can perform surgical first aid.)
- h. The veterinarian uses aseptic surgical procedures whenever applicable.
- i. Veterinarians and support personnel are compassionate and knowledgeable about the humane aspects of monotreme, marsupial and small insectivore treatment, including the proper use of anesthetics, analgesics, and tranquilizers.
- j. Surgical incisions are observed daily, or as frequently as possible while minimizing stress to the animals, for signs of dehiscence or infection. Analgesics are administered post-operatively when appropriate.

Treatment

- k. Medications are maintained and used in accordance with local, state/province, and national laws and regulations and are administered in accordance with the state veterinary practice act, or equivalent outside the US.
- l. The sanctuary has a pharmacy on-site where routinely used drugs, such as emergency resuscitative medications, antibiotics, anthelmintics, fluids, anesthetics, analgesics, tranquilizers, etc. are maintained.
- m. All medications are purchased, prescribed and administered under the guidance of the veterinarian.
- n. When distributed to animal caregivers, medications are properly labeled and packaged, with the contents identified and instructions for the amount, frequency and duration of administration as well as the name and identification of the animal to receive the medication, the expiration date of the medication, prescribing doctor and number of refills if any.
- o. All medical treatments and drug prescriptions are documented in the monotreme, marsupial or small insectivore medical record.
- p. Basic physical capture and restraint equipment to facilitate medical treatment is available at the sanctuary.

Necropsy

- q. Whenever possible, there is an isolated area on the grounds for performing necropsies, or appropriate storage facilities until the deceased monotreme, marsupial or small insectivore can be transported to a facility for a postmortem examination, as soon as possible, understanding that necropsies performed longer than 24 hours after death be of limited value due to autolysis. (Note: Any refrigerated area for holding dead animals is physically separate from live animal holding, treatment, and surgery areas and from food supply storage or preparation areas.)
- r. Disposition of dead monotremes, marsupials or small insectivores and their parts meet all legal restrictions.
- s. Dead specimens not used are incinerated or disposed of as deemed suitable by the veterinarian in accordance with local, state/province and national regulations.

V-5. Quarantine and Isolation of Monotremes, Marsupials and Small Insectivores

Appropriate quarantine and isolation policies and accommodations are in place and utilized.



- a. Upon arrival, all monotremes, marsupials and small insectivores undergo quarantine for a minimum of 30 days or according to the protocol established by the attending veterinarian, or for a greater period if required by applicable law. The quarantine period should be longer (at least 60-90 days) for those animals that have received minimal screening prior to arrival, such as animals from the wild. Animals previously housed together may be quarantined together.
- b. If the sanctuary does not have an adequate quarantine facility, steps should be taken to have monotremes, marsupials and small insectivores undergo quarantine under these guidelines prior to their arrival.
- c. Local, state/province, or national regulations regarding quarantine of newly arrived monotremes, marsupials and small insectivores are followed.
- d. All utensils and outer clothing used in quarantine are restricted to that area.
- e. Protective clothing, boots and footbaths are used by all staff entering the quarantine area or areas containing quarantined animals. Quarantine clothing is not removed from the quarantine area, except in a sealed container for cleaning.
- f. Caregivers wear protective gloves and masks when cleaning or handling anything with which the quarantine animals come into contact.
- g. Where possible, staff working in quarantine areas does not work with other sanctuary animals. If this is not possible, work is done in the quarantine areas last.
- h. Quarantine staff cares for newly admitted animals in their quarantine area before caring for sick animals, which are housed in separate isolation enclosures.
- i. The quarantine area allows for daily cleaning and sanitation, either with removable catch trays or a drainage system that allows fecal matter to flush into a septic system; waste is otherwise removed and disposed of properly.
- j. In enclosures housing animals carrying infectious or transmissible diseases, to the extent possible, all surfaces of the enclosure are properly sanitized.
- k. Quarantine areas have adequate ventilation, heat and air conditioning, which are used to ensure optimum conditions, particularly in the case of young, elderly or sick monotremes, marsupials and small insectivores who may be more sensitive to environmental changes.
- l. Quarantine animal waste is handled separately from all other manure or compost at the facility. Because of the risk of disease transmission, quarantine waste is not spread on pastures or composted.

V-6. Medical Records and Controlled Substances

Complete medical records are maintained, appropriate statistics maintained, monotremes, marsupials and small insectivores have permanent identification, and controlled substances are prescribed and stored legally.

Medical Records

- a. An electronic database format is recommended for most record keeping, but in either case, the sanctuary has a back-up system for the records.
- b. Records that, if not required by law, are required by GFAS include but are not limited to:

Individual Records

- Individual animal records showing origin, age, species, gender, microchip number, tattoo, photo, bio, etc.;



- Individual veterinary record;
- Reproductive history, if known;
- Weight, current diet and record of diet changes;
- Food consumption and preferred food items;
- Where applicable and appropriate, any positive reinforcement training records showing completed objectives and those in development;
- For species not housed in large groups, current and historic enclosure mates, social groups and partners, including response to various phases of introduction and response to other individuals;
- Acquisition documents;

Group Records

- Welfare assessment for the monotremes, marsupials and small insectivores as a whole including measures of: disease prevalence, morbidity and mortality rates, and activity levels;
 - Inspection Reports, as applicable, from international, national, state/province and local agencies, as well as accrediting organizations;
 - Other animal documentation, as applicable, such as complaints or police reports pertaining to specific animal, and animal escape reports.
- c. Medical records are dated, legible and indicate examination findings, treatments (types of medication, dosage, duration), surgical procedures, anesthetic procedures (type of agent, dosage, effect), results of all laboratory tests (parasitological, hematologic, bacteriologic, etc.) pathology reports, plus immunization records with all relevant dates, animal identification and nutrition/diet information, and, where applicable, necropsy reports.
- d. Copies of medical records accompany any animal who is transferred to another sanctuary.
- e. Medical records are maintained under the direction of the veterinarian or trained monotreme, marsupial and small insectivore caregiver. Where possible, duplicate record sets are stored at another site, or in a fire proof or theft proof safe on site or an online storage system.
- f. Statistics are tabulated regularly on the rates and nature of illness and mortality in the sanctuary.

Controlled Substances

- g. Only a licensed veterinarian prescribes controlled substances used at the sanctuary, and all such substances are secured in accordance with any applicable laws.
- h. The sanctuary maintains appropriate records and logs for all controlled drugs used. All drug logs are kept up to date and comply with any national or other legal requirements (such as the Drug Enforcement Agency in the U.S.).
- i. Expired drugs are marked as such and stored separately.
- j. When disposing of drugs, they are discarded in accordance with applicable national, state, and local law and regulations (such as the USDA and DEA in the United States).

V-7. Breeding/Contraception

No intentional propagation of monotremes, marsupials or small insectivores occurs, and sound practices are in place and implemented to prevent propagation and to properly care for infants born at the sanctuary.



- a. Although GFAS recognizes the importance of appropriate “conservation breeding” programs, they fall outside the mandate of GFAS Accreditation programs unless they adhere to the following guidelines:
- Animals are not brought into captivity for the purpose of breeding. Animals that are allowed to breed should enter a wildlife facility as a result of normal acquisition protocols such as surrender or government confiscation and be considered an endangered or threatened species with available release sites within the state/province, conducted with specific conservation goals, in accordance with local, state/province, national, and international law and regulations.
 - Breeding should not be forced – that is, not the result of artificial insemination or being placed in enclosures of insufficient size or otherwise not in keeping with GFAS standards.
 - Breeders – that is, the parent animals – should be released into the wild with their young. If breeding animals are deemed non-releasable, there should be documented evidence from a qualified professional that the animals cannot be released because of a physical condition or other reason that would make them unable to survive in the wild. Offspring of non-releasable parents should not be released until an age of species-specific maturity for survivability.
 - Non-releasable breeding animals should receive the care required of all animals under the GFAS standards and should not be maintained for the purpose of breeding if they have incurable or unmanageable pain or suffering and do not have an acceptable quality of life.
 - The facility should have an identified release site for the breeding animals and offspring, with any necessary permits or memoranda of understanding in place. While GFAS may consider whether a definite plan (such as ongoing surveys of land for potential release sites and a timeline for releasing animals) is sufficient, it will not be sufficient for a facility to simply say that it hopes or plans to be able to release the animals one day. Thus, a facility may not breed any animals in captivity, even highly endangered animals in order to create a sustainable population, without a definite release plan in place.
- b. The sanctuary has species-appropriate contraceptive programs in place with the method of contraception used based on current best practice and attending veterinarian recommendations. (See *Appendix 1 for further information on contraception methods for monotremes, marsupials and small insectivores*).
- c. If females arrive at the facility pregnant, the sanctuary provides necessary care and the female is allowed to deliver unless there are valid health reasons for terminating the pregnancy, or unless the attending veterinarian feels the pregnancy is in such an early stage that aborting the fetus is an option, if so desired by the sanctuary. After delivery, reproductive control methods are applied after allowing adequate time for weaning as appropriate for that animal, provided there is no further opportunity for breeding during this period of time.
- d. Infants born at the sanctuary remain with the mother as appropriate for natural rearing, provided there is no further opportunity for breeding during this period of time. Infants are only removed from females for hand-rearing if there is a threat to the life of the infant or the mother.

V-8. Zoonotic Disease Program

The staff and sanctuary veterinarian are knowledgeable about zoonotic diseases that may affect monotremes, marsupials and small insectivores at the sanctuary, and implement appropriate policies and procedures as needed to mitigate risk and deal with any exposures that occur.



- a. The sanctuary's veterinarian is knowledgeable about zoonotic diseases that may affect monotremes, marsupials and small insectivores at the sanctuary. All potential or emerging diseases have emergency procedures and a defined process to avoid transmission of diseases through bites, scratches, body fluids, direct contact with animals and other means. (Note: Additional precautions may be necessary for staff classified as increased risk of disease, including those who are immune-compromised.)
- b. Personnel have adequate training to understand the potential risk of disease transmission, including potential sources of disease, modes of disease transmission, and clinical signs associated with disease.
- c. All personnel are informed when a zoonotic disease occurs at the sanctuary.
- d. When a reportable disease is identified, all appropriate local, state/province, and national regulatory officials are contacted.
- e. All areas in which the staff has direct contact with monotremes, marsupials or small insectivores have hand-washing facilities available in the immediate vicinity (or an equivalent; e.g., bactericidal hand-wipes)
- f. Human food consumption by the staff does not occur in the immediate area of animal contact.
- g. Rabies testing and vaccination protocols vary by location. Federal, state or province and local rabies prevention protocols supersede recommendations made in this document.

V-9. Euthanasia

Euthanasia is governed by an ethical written policy that includes identification of appropriate personnel and procedures.

- a. The sanctuary has a written policy addressing the circumstances surrounding euthanasia decisions and procedures, including the following:
- b. Euthanasia is performed in compliance with any national or local law, administered under the strict supervision of a licensed veterinarian. In extreme circumstances of animal suffering when a veterinarian is unable to reach the sanctuary in a timely manner, an emergency method of euthanasia may be required and is performed by a trained and qualified staff member when no other humane option is available.
- c. Euthanasia is in the best interest of the individual animal only used as a final option, and is not used as management tool (such as a means to create space for more animals).
- d. Acceptable reasons for euthanasia include:
 - Incurable disease/injury that is likely to cause unmanageable pain or suffering;
 - Disease/injury where treatment is likely to cause unreasonable pain or suffering;
 - Disease/injury where treatment will not be effective in restoring the animal to an acceptable quality of life;
 - Disease/injury where treatment is beyond the normal community standards of monetary expenditure and would cause an excessive burden on the sanctuary resources, and no other sanctuary can step in, after reasonable efforts to locate such a sanctuary;
 - The process of aging has resulted in an unacceptable quality of life;
 - In the event of presenting an infectious disease risk to some or all of the residents.
 - For facilities engaged in the rehabilitation and reintroduction of wildlife, it is determined in accordance with an appropriate protocol or other “decision tree” analysis that an animal cannot

- be reintroduced to its natural habitat and there is no appropriate (consistent with these standards) long-term care option.
- e. Euthanasia is performed so that it avoids distress to the monotreme, marsupial or small insectivore, and unless impossible, is performed out of view of other animals.
 - f. The species and ecosystems are carefully considered during disposition activities.

Well-Being and Handling of Monotremes, Marsupials and Small Insectivores

W-1. Physical Well-Being

All monotremes, marsupials and small insectivores are routinely monitored to ensure their physical well-being. All aspects of husbandry, including veterinary care, environmental enrichment and diet are designed to optimize the animals' physical well-being.

- a. The welfare of each individual monotreme, marsupial and small insectivore is the overriding consideration in all sanctuary actions.
- b. Monotremes, marsupials and small insectivores are able to enjoy lives that are as close as possible to that of their wild counterparts as regards stimulation and interest. This is achieved by adopting husbandry and management procedures, including appropriate housing and enclosure design, environmental enrichment programs, positive reinforcement training programs and a balanced diet to meet nutritional requirements.
- c. Monotremes, marsupials and small insectivores are provided with species appropriate opportunities to tunnel, climb, swim, forage for food, and play by providing species-appropriate climbing structures, tunnels/burrowing/digging areas, water features, a variety of plants, logs and substrates and other enclosure enhancements and there are places to hide and rest in comfort.
- d. Regular assessments are performed in an effort to quantify and measure the welfare of individual animals through monitoring of nutritional, physical and social conditions. Qualified personnel conduct daily observations of each monotreme, marsupial and small insectivore to monitor for signs of physical abnormalities. Any unusual activities are recorded in a log at each inspection. Sudden changes in food consumption and other behaviors are immediately brought to the attention of supervisory staff. Note: In open space enclosures, it may not be possible to observe each animal on a daily basis. In such habitats, it is important to get an accurate count and to spend time observing all animals on a weekly basis.
- e. Where possible and appropriate, records of individual monotremes, marsupials and small insectivores are kept to provide both behavioral and veterinary history.
- f. Where possible and appropriate, each animal is weighed annually, either during a routine physical or through the use of a built-in scale, to monitor for signs of illness and to determine dosages for chemical anesthetics.
- g. Positive reinforcement training may be appropriate for monotremes, marsupials and small insectivores who enjoy interacting with people, to provide additional enrichment, to reduce the need for chemical immobilization and to reduce stress during medical intervention.

W-2. Social Housing

Monotremes, marsupials and small insectivores are grouped appropriately with the safety of animals and staff in mind.

General

- a. Monotremes, marsupials and small insectivores housed together are compatible and all animals have ample space to retreat and hide as needed while social tensions are resolved.
- b. Monotremes, marsupials and small insectivores are not housed near animals that interfere with their health or cause them physical or psychological discomfort.
- c. Habitats are of sufficient size to allow appropriate space between individuals in social groupings and to allow for temporary isolation from conspecifics.
- d. Monotremes, marsupials and small insectivores are housed so that no individual endures constant harassment or suffers physical injury, and so social behaviors do not prevent any individual from maintaining proper nutrition and hydration.
- e. Close attention is paid to monotremes, marsupials and small insectivores in social housing, with age, species, and sex of animals housed together taken into account.

Social Housing

- f. The individual development and history of each monotreme, marsupial and small insectivore is taken into account when determining social groups.
- g. Many of the solitary species in these groups will tolerate others provided there is sufficient space in the enclosure for animals to naturally separate.
- h. Territorial species are monitored for aggression.
- i. Wallaby social structure varies from solitary to small group situations but many species congregate in feeding areas, sometimes forming groups of 100 or more animals.
 - Open space enclosures are designed to allow for this fission-fusion behavior by providing areas for individuals and small groups to move away from the main group as desired.

Solitary Housing

- j. Is generally temporary and reserved for situations including but not limited to quarantine, medical assessment or care, lack of appropriate social partners, or social tension resulting in disruption to the main group or physical aggression leading to injuries.
 - As possible and appropriate, monotremes, marsupials and small insectivores housed alone temporarily are given visual, olfactory and auditory contact with their social group.
 - Solitary species may be housed alone provided they are regularly monitored for behavioral issues.

W-3. Introduction of Unfamiliar Individuals

Introduction of any new bear to a social group is done according to techniques appropriate for each species, with staff safety ensured.



General

- a. Introduction of unfamiliar monotremes, marsupials and small insectivores are monitored closely for tension, aggression, etc.
- b. Food and water consumption is monitored carefully to ensure that all animals are able to access food/water. Staff ensures monotremes, marsupials and small insectivores are not hiding, unable to approach/access food and water.
- c. Monotremes, marsupials and small insectivores have access to separate shelter, ample room to move away from each other and no opportunities for an animal to be cornered.
- d. As needed and possible, information listed below is gathered for the introduction planning process:
 - A list of individual animals to be introduced, including all that the sanctuary ultimately hopes to integrate into a group.
 - Background of each individual, including but not limited to: age and gender; social experience with other monotremes, marsupials or small insectivores; rearing history (hand-reared, parent reared, time spent with mother and siblings).
- e. As appropriate or needed, benchmarks or desired outcomes are identified for each step in the process. Examples include:
 - physical location of animals during visual and/or tactile contact period;
 - behavioral goals of visual and/or tactile contact period;
 - benchmarks for proceeding to physical introduction;
 - space and enclosures to be used for physical introduction;
 - reasons location selected: neutral space, ample run around, visual barriers, doors that can be closed to protect animals in trouble etc.;
 - set-up for physical introduction, enrichment etc.;
 - emergency equipment that might be needed;
 - time frame necessary to acclimate animals to presence of equipment;
 - criteria for separating animals if physical introduction does not proceed safely;
 - post introduction management and husbandry protocols.
- f. The plan is developed with involvement of all staff involved with care of the species and details a series of steps that will be taken to integrate the individual animals involved. Necessary modifications to enclosures are identified and completed prior to beginning the process.
- g. The plan establishes behavioral goals for introductions and is not driven by schedules, and is open to modification as introduction/integration develops and evolves.
- h. Only normally scheduled caregivers and animal managers are present to directly observe. Individuals who are not routinely present in the animal area, including veterinary and management staff, observe via remote video or receive reports from staff.
- i. All caregivers have a clear understanding of the plan including contingencies for problems that might occur, and are empowered to take appropriate action in the event of perceived emergency.
- j. If the introduction is not successful, no attempt is made to reunite the individuals until housing or social circumstances can be changed or other factors that may have contributed to the problems, such as breeding season, have been resolved.

W-4. Behavioral/Psychological Well-Being

The behavioral/psychological well-being of each monotreme, marsupial and small insectivore is evaluated and addressed, and a welfare plan and report is part of each animal's file.

General

- a. There is a formal, written enrichment program that promotes species-appropriate behavioral opportunities and ensures the captive animals' psychological well-being. A complete environmental enrichment program includes the following:
 - Structural enrichment - Enclosure design and furniture that add complexity to the environment and promote species-specific behavior.
 - Object enrichment – Objects that encourage inspection, manipulation and problem solving, and promote species-specific behavior.
 - Food enrichment - Varying food choices and food presentation.
 - Social enrichment - Affiliative interactions between caregivers and monotremes, marsupials or small insectivores may be appropriate in some instances. The decision to include social enrichment with caregivers should be made on an individual basis, considering only the social needs of the animal, such as solitary animals, particularly those hand reared by humans with no conspecific contact or neonatal and juvenile animals in situations where appropriate.
- b. All monotreme, marsupial and small insectivore care staff are trained to recognize abnormal behavior and clinical signs of illness. Measures of well-being that are assessed include:
 - species appropriate behavior and interaction with other animals;
 - the animal's ability to respond appropriately to variable environmental conditions, physiological states, developmental stages, and social situations as well as adverse stimuli.
- c. Stereotypic behavior, self-injurious behavior, and inappropriate responses to various stimuli not previously documented or witnessed may be evidence of compromised well-being and are investigated. A welfare plan to address the concerns is developed (*see Appendix 1 for details of stress related behaviors in various monotreme, marsupial and small insectivore species.*).
- d. Where possible and appropriate, a behavioral/psychological profile is maintained for each individual/pair or group of monotremes, marsupials and small insectivores and updated annually and a copy is kept in the individual/pair/group's permanent file.

W-5. Monotreme, Marsupial, Small Insectivore-Caregiver Relationships

Positive relationships between monotremes, marsupials and small insectivores and caregivers are maintained. Animals are not fearful or aggressive in response to human presence or routine care procedures.

General

- a. Monotremes, marsupials and small insectivores arrive at sanctuaries with a variety of previous experience with caregivers, which caregivers take into account in their interactions with these species.
- b. Facility design plays a key role in caregiver-animal safety and the ability to maintain a positive relationship.
- c. A protocol for introducing animals to new caregiver staff has been developed.
- d. A positive relationship between the animals and regular caregivers, animal managers and veterinary staff is one in which the monotremes, marsupials and small insectivores are given the freedom to integrate with their conspecific social group with minimal human interference or to interact regularly with caregivers if they choose.
- e. Where possible and appropriate, animals become familiar with the veterinary staff, allowing close observation. Individual animal preference for interaction with caregivers, animal managers and veterinary staff is taken into account.
- f. The animals do not become fearful or overly aggressive in response to human presence or routine care procedures.
- g. Interactions with monotremes, marsupials and small insectivores do not cause overheating, excessive cooling, physical harm, or unnecessary discomfort, and minimizes physical and psychological stress or trauma as much as possible.
- h. Negative interactions are avoided. However, when they occur, efforts are made to recover trust and a positive relationship if the animal enjoys regular interaction with people
- i. Physical abuse, deprivation of food or water, aversive spraying with a hose, and other forms of negative reinforcement or punishment-based training are never used to train, shift or otherwise handle monotremes, marsupials and small insectivores. Note: This does not preclude the use of hoses or other watering devices in caring for the animals who enjoy this form of enrichment.

W-6. Handling and Restraint

Any necessary handling and restraint is done safely and appropriately, with minimal distress to monotreme, marsupial and small insectivore, and staff are trained in species-specific safe handling techniques/practices.

General

- a. Handling for veterinary care is done as expeditiously and carefully as possible in a manner that does not cause trauma, overheating, excessive cooling, physical harm, or unnecessary discomfort, and minimizes physical and psychological stress as much as possible.
- b. Where possible and appropriate, Positive Reinforcement Training is used to minimize the need for chemical immobilization and to reduce stress during procedures.
 - With appropriate training, many procedures can be performed cooperatively and without anesthesia, such as examination of body parts, treatment of superficial injury, heart rate monitoring, injection administration, etc.
- c. If physical restraint or drug delivery systems must be used, the lightest and least stressful methods that are appropriate are chosen, bearing in mind the safety of staff and animal.
- d. A written policy for the humane chemical restraint and safe capture of animals housed at the sanctuary is in place, to include:
 - Training and certification in the equipment, humane chemical restraint, immobilization process, and the use of drugs for veterinarian purposes or emergencies;
 - Procedures listing at a minimum those persons authorized to administer animal drugs, situations in which they are to be utilized, location of animal drugs in a safe and secure place, and those persons with access to them, and an emergency procedure in the event of accidental human exposure.
- e. All chemical restraint equipment is cleaned after each use, maintained in good working order and tested on a regular basis.
- f. Chemical immobilization is performed only by a licensed veterinarian or by trained staff under the guidance of a licensed veterinarian, or other qualified individuals authorized by the sanctuary director or veterinarian, following the laws and regulations of country where the animals are housed. Specific anesthetic protocols, including record-keeping, are followed.
- g. Chemical restraint is not used when multiple animals are in an enclosure except in an emergency situation. In such cases, all possible precautions are taken to prevent threats to the handlers and the animal being sedated.

W-7. Animal Transport

Monotremes, marsupials and small insectivores are appropriately transported to maximize safety and minimize stress and in accordance with all local, state/province, national, international requirements and laws.

General

- a. Monotremes, marsupials and small insectivores are transported only when necessary, such as when being transported to the Sanctuary, to a medical facility for care or to another accredited Sanctuary for reasons as described in acquisition standards.
- b. Pre-transport health examinations ideally include a complete physical exam with attention to parasite checks, necessary vaccinations, and completion of any tests required by regulations of the receiving state/province or country.
- c. Health certificates and any required transport permits accompany the monotreme, marsupial or small insectivore when being transported interstate or internationally. All transport abides by local, state/province, federal and international law. A veterinarian is responsible for preparing and signing the health certificate.
- d. Prior to transport, the sanctuary ensures that adequate facilities are available at the receiving end and food items that are familiar to the animal are available.
- e. Where possible and appropriate, animals are acclimated to shipping container prior to transport. Capture, restraint, and transportation methods consider the animal's temperament and behavior in order to minimize injury, and distress.
- f. At a minimum, transport enclosures meet appropriate animal welfare standards (e.g., IATA, US Animal Welfare Act Transportation Standards or similar).
- g. Transport containers and vehicles are in good condition and meet federal and/or international standards. Equipment suitable for lifting, crating and transportation of animals kept within the sanctuary is readily available.
- h. Transport containers:
 - have impervious surfaces, which are cleaned and disinfected after use.
 - are designed to permit safe transfer into a secondary enclosure.
 - are placed within a secondary container or closed compartment on the transport vehicle.
- i. Any monotreme, marsupial or small insectivore taken outside the sanctuary, for an approved reason such as medical treatment or transfer to a more appropriate sanctuary, is in the personal possession of the sanctuary director, or of competent persons acting on his/her behalf and adequate provision is made for the safety and well-being of the animal and public safety.
- j. All animals taken outside the sanctuary are kept securely at all times. Animals are managed outside the sanctuary in such a way that the animal is under control and not likely to suffer distress, cause injury or transmit or contract disease.
- k. Complete medical records, diet and husbandry information, and identifying papers (e.g., describing tattoos, or other identification methods) accompany all transported monotremes, marsupials and small insectivores.

MONOTREMES, MARSUPIALS AND SMALL INSECTIVORES BEING RELEASED TO THE WILD

GFAS strongly supports the efforts of wildlife rehabilitators and sanctuary managers to return wildlife to its natural environment, provided appropriate steps are taken to ensure that the animals released are likely to survive in the wild.

Facilities releasing monotremes, marsupials and small insectivores to the wild must also make every effort to reduce risk of their having a damaging impact on ecological resources, including other animal species, found naturally in the release area. Examples of risk factors include but are not limited to:

- Displacement of indigenous animals;
- Transmission of novel pathogens;
- Disruption of local human communities, including damage to dwellings and injury to local inhabitants;
- Alterations to the environment that disrupt the ecological niche of other species.

For a more detailed discussion of the potential risks, as well as time and financial commitment involved in creating a quality re-introduction project, see the International Union for the Conservation of Nature Species Survival Commission (IUCN/SSC) Reintroduction Specialist Group's "Guidelines for Re-Introductions".

R-1. General Considerations

The sanctuary has policies, agreements and plans in place to optimize the chances for successful re-introduction of monotremes, marsupials and small insectivores into the natural environment.

- a. The facility has a written policy regarding the handling of any potential problems involving released animals. The policy should include but is not limited to:
 - a plan to minimize the risk to human life and property in the area of release;
 - a plan for compensation for or mitigation of damages incurred by the released animals;
 - a deterrent plan to discourage inappropriate activities, *i.e.*, crop raiding, spending time around human habitation.
 - a plan for management or removal of animals who fail to integrate appropriately or who become habitual 'problem animals.'
- b. In as much as possible, using the latest available information on potential health concerns regarding other species found in the area of release, animals are tested and treated for pathogens that might pose a threat to other wildlife.
- c. The facility has agreements in place with any and all appropriate authorities to allow the release process to proceed as smoothly as possible.
- d. Ideally, permissions, any necessary documentation, site determination, etc. begin as soon as it is determined that there are animals in care that are likely to be suitable for release.
 - In particular, facilities obtain any permits or other forms of authorization needed to proceed with the release.
 - Potential release sites are identified and evaluated as early in this process as possible.
- e. Cooperative agreements are in place prior to animals being released which may include, but are not limited to:
 - veterinary and scientific involvement in post-release monitoring;
 - community acceptance of the project and involvement in habitat protection and awareness raising;
 - landowner agreements enabling release, including the addressing of specific permissions and permits;
 - involvement of NGOs with similar or conflicting interests that may impact (positively or negatively) the project.

R-2. Rescue Of Monotremes, Marsupials and Small Insectivores

The sanctuary has developed guidelines for rescue work, taking into account staff and animal safety, contingencies for caring for the animal once rescued, and any local, state or national regulations or agency cooperation required.

- a. Facilities accepting monotremes, marsupials and small insectivores from the illegal trade have policies and procedures (ideally in writing) in place with the appropriate authorities that allow for rapid transfer of the animals to the sanctuary or rescue center. These policies and procedures are designed to reduce the risk of:
 - disease transmission;
 - habituation;
 - Inappropriate or inhumane treatment, due to lack of knowledge, by personnel involved in seizure of wildlife from the illegal trade.
- b. In as much as possible, while respecting local or national cultural/religious tenets, a euthanasia policy is in place to address situations where the animal's prognosis for survival is too low to warrant attempting treatment.
 - In situations where field euthanasia is being considered, where possible and appropriate (e.g., the animal is reasonably safe from further human interference and the stress of capture would outweigh the benefit of humane euthanasia), the option of leaving the animal *in situ* may be considered.
 - See also Standard V-9, "Euthanasia."

R-3. Evaluation Of Suitability For Release

Monotremes, marsupials and small insectivores admitted into sanctuary are evaluated for their potential suitability for release.

- a. The sanctuary has a protocol in place (ideally in writing) to evaluate potential release candidates and to determine which animals are given priority for potential release.
 - Animals who have spent little time in captivity and/or who have had little human contact are given priority for potential release.
 - Animals found to be free of diseases and/or parasites of potential concern to the health of the population, particularly in the intended release area, are given priority for potential release.
- b. All monotremes, marsupials and small insectivores are treated as potential release candidates, particularly those who have not been kept long term as pets. If animals admitted into sanctuary are determined to be potential release candidates, every effort is made to protect them from exposure to human disease and to keep them as wild as possible.

R-4. Quarantine And Prerelease Housing

The sanctuary has appropriate quarantine facilities and prerelease housing for monotremes, marsupials and small insectivores, with consideration given to sick and injured animals.

(See also Standards H-1 to H-9, “Monotreme, Marsupial and Small Insectivore Housing,” and V-5, “Quarantine and Isolation of Monotremes, Marsupials and Small Insectivores”)

General

- a. Non-quarantine housing for monotremes, marsupials and small insectivores being considered for release provides as close to natural a setting as possible. The space allows for foraging, digging, climbing, nesting/tunneling, swimming and other actions naturally performed in the wild.
- b. Quarantine facilities and prerelease housing for monotremes, marsupials and small insectivores intended for release are situated a minimum of 66 ft. (20m), giving consideration to factors such as wind direction, from resident animal populations to protect them from exposure to pathogens present in the sanctuary population that could compromise their return to the wild. A wall surrounding the quarantine area reduces pathogen transfer risk and aids in restricting access to authorized personnel.
 - Where this is not possible, sanctuary residents are screened for potential pathogens of concern, and pathogen-free animals are housed closest to the animals intended for release to the wild.
- c. Where possible and appropriate, sanctuaries follow National Wildlife Rehabilitators Association guidelines (<http://www.nwrawildlife.org/content/minimum-standards>) in dividing housing into three types:
 - Restricted activity/mobility – for the initial stages of rehabilitation where the illness or injury requires the animal be treated and/or prevented from activities that would slow the rehabilitation process. At a minimum, the animal is able to maintain normal upright/alert posture and to stretch the body.
 - Limited activity/mobility – for the recovery stage of rehabilitation where the animal is regaining mobility and building strength, and staff does not need access to the animal on a daily basis. The animal is able to move short distances and perform some climbing and perching activities.
 - Unlimited/Prerelease – the final stages of rehabilitation where the main concern is ensuring that the animal is fit for release. In this phase, the enclosure provides the monotremes, marsupials and small insectivores with opportunities to demonstrate the skills necessary for survival in the wild.

Quarantine Housing

- d. Sick or injured wildlife is quarantined in such a way that the rehabilitation process is begun during the quarantine phase.
- e. Quarantine facilities have appropriate housing for the treatment of injured or ill monotremes, marsupials and small insectivores.
- f. Quarantine facilities are designed to allow for monitoring and, as needed, modification of behavior of animals intended for release.
- g. Healthy monotremes, marsupials and small insectivores admitted to quarantine have as large an enclosure as possible to help maintain natural locomotion and foraging behaviors.
- h. Upon arrival, animals are quarantined for an adequate number of days, ideally for a minimum of 60 days. In some situations, a longer quarantine may be advisable.



- i. The attending veterinarian works closely with regional, national and international experts and authorities to determine appropriate quarantine timing based on health risks to which the newly admitted monotremes, marsupials and small insectivores may have been exposed.
- j. Orphaned monotremes, marsupials and small insectivores, particularly those who have been kept as pets and potentially exposed to human pathogens, are isolated until any potential health risks are evaluated.

Initial Housing for Orphaned, Ill or Injured Monotremes, Marsupials and Small Insectivores

- k. Animals admitted requiring treatment for illness or injury are housed in enclosures that allow for ease of care. These initial care enclosures can be smaller than that which is acceptable for long-term care.
 - Dependent on illness or injury, either Restricted or Limited activity/mobility housing may be utilized.
- l. Enclosures provide visual and acoustic barriers to minimize stress.
- m. Orphaned monotremes, marsupials and small insectivores are housed in nursery units, preferably with conspecifics, as species appropriate.

Intermediate Housing for Orphaned Monotremes, Marsupials and Small Insectivores

- n. As soon as the orphaned animals have been weaned, they are moved to intermediate housing, where human contact is decreased and interaction with conspecifics, as species appropriate, is increased. Where possible, the animals are moved to the release site and cared for in a soft release enclosure.
- o. Animals are provided with adequate opportunity for climbing, nesting, swimming, tunneling and foraging, as species appropriate.
- p. Intermediate housing is isolated from resident animal areas, ideally within a natural habitat which allows the orphans to adjust to a more wild environment.

Intermediate and Prerelease Housing for Sick or Injured Monotremes, Marsupials and Small Insectivores

Note: Adult and independent subadult animals, dependent on their admitting condition, may not require intermediate housing.

- q. Monotremes, marsupials and small insectivores suffering from injuries that may affect their suitability for release are moved to intermediate housing while regaining strength. Animals are regularly evaluated to determine whether they are likely to be releasable. Once the animals are deemed fit, they are moved to prerelease housing.
- r. Independent animals brought in for rehabilitation who can be released back into the environment from which they came are returned as soon as it is determined that the animal has recovered sufficiently to resume its presence in its former area.
- s. Consideration is given to social and territorial issues that may affect safe return to the original habitat.
- t. Prerelease housing for adult and independent subadult animals is ideally situated at the intended release site, allowing the animals to acclimate to their new environment before release.
- u. In both intermediate and prerelease housing, sufficient vertical as well as horizontal space is provided, as species appropriate, to allow the animals to develop strength and display normal wild behaviors.

R-5. Diet, Nutrition And Foraging Skills

Monotremes, marsupials and small insectivores are fed an appropriate diet that approximates that which will be found in the habitat to which they are released, and foraging behavior is encouraged.

- a. As early in the rehabilitation process as possible, monotremes, marsupials and small insectivores are exposed to the types of foods found naturally within the environment where they will be released and assessed for their ability to find appropriate foods and avoid inedible or poisonous foods.
- b. Release candidates are fed in such a way as to encourage natural foraging behaviors.
- c. Rescued animals admitted in poor physical condition may require specialized diets to recover their health. Nutritional deficiencies are assessed and diets modified to address those deficiencies. Once the animals are back on a normal nutritional plane, any foods not found in their planned release area are no longer fed.

R-6. Husbandry And Health

All aspects of care, including caregiver-animal relationships, introduction to social groups and overall health evaluation, are focused on preparing the monotremes, marsupials and small insectivores for return to the wild.

- a. Once a monotreme, marsupial or small insectivore has been evaluated as a potential release candidate, all aspects of care are focused on preparing the animal for the wild.
 - Human activities and noises are minimized in areas housing animals being prepared for reintroduction.
 - Human interaction with animals being prepared for release to the wild is restricted to those activities that will enhance the animals' ability to live in the wild.
- b. The animal is placed in an appropriate social group or paired with a compatible conspecific, depending on species. Dependent young may be reared by human caregivers using approved best practices for the species housed.
 - Care is taken to balance the need to nurture these young animals with their need to develop appropriate survival skills as well as intraspecific social behaviors.
 - Animals are integrated into an appropriate social group, ideally comprised of other conspecifics intended for release, as quickly as possible.
- c. Introductions follow Standard W-3 "Introduction of Unfamiliar Individuals."
- d. Opportunities to explore, climb, dig, forage and learn skills in the natural environment are provided.
- e. Monotremes, marsupials and small insectivores admitted into care from the wild at the stage where they are already independent, with recoverable illness or injury problems, are treated and released as quickly as possible, taking into account the potential for the animal not being accepted back into its previous social group or territory.
- f. Caregiver-animal relationships for animals intended for release to the wild, while ensuring the animals' psychological well-being is met, focus on:
 - avoiding any types of interaction that may compromise the animals' chances for release;

- encouraging the monotremes, marsupials and small insectivores to develop appropriate relationships with conspecifics for their social needs.
- g. Veterinary staff evaluate overall health including:
- recovery from the initial cause for admission to the facility;
 - pathogen surveillance to ensure the animal does not present a risk to the wild population as a result of exposure during the rehabilitation process.
 - In as much as possible, using the latest available information from the OIE-World Organization for Animal Health (www.oie.int) and the IUCN's Conservation Breeding Specialist Group (<http://www.cbsg.org>), animals are monitored for human pathogens not found in the wild population.
- h. Monotremes, marsupials and small insectivores being cared for in sanctuary for later release back to the wild are managed in such a way as to optimize their chances for successful return to the natural environment.

R-7. Health And Safety Of Caregivers Working With Releasable Monotremes, Marsupials and Small Insectivores

No caregiver begins work with releasable monotremes, marsupials and small insectivores until routine testing has indicated he or she poses no risk to the animals' release to the wild.

(See also Standard V-8, "Zoonotic Disease Program")

- a. Caregivers working with animals intended for release to the wild are routinely monitored for potential anthroponoses (diseases that have potential to be transmitted to the animals).
- b. Testing, vaccinations and fecal cultures for pathogens may be utilized, as appropriate for the region, to ensure the health of both the monotremes, marsupials, small insectivores and their caregivers. New caregivers should not have contact with the animals for the first two weeks of employment.
- c. Provision of adequate nutrition for staff is considered as a possible contribution to the continued well-being of both staff and animals.

R-8. Assessment of Health and Skills

Monotremes, marsupials and small insectivores are fully assessed for health and appropriate skills prior to release.

- a. Monotremes, marsupials and small insectivores who have completed the rehabilitation process and have been successfully integrated into a social group or pair, as is species appropriate, are further evaluated for release, with attention to health and the skills attained.
- b. Each animal's skills (e.g. foraging, nesting, appropriate interaction or avoidance behaviors in the presence of conspecifics, avoidance of dangers including poisonous foods or predators) are evaluated.
- c. A complete health assessment is performed including:
 - Overall fitness as relates to being able to survive in the wild, keep up with a conspecific group, avoid predators, etc.

- Injuries and limitations that originally caused the animal to be brought into care are resolved, either completely, or to the extent that the animal has a reasonable chance for long-term survival.
- d. Monotremes, marsupials and small insectivores have been tested, and found free of pathogens that have potential to harm the wild population in the planned release area, based on the latest current knowledge.
- e. Genetic assessment has been done to ensure that the monotremes, marsupials or small insectivores being released are of an appropriate subspecies/population/subpopulation for the release site if their origin is not known.
- f. Monotremes, marsupials and small insectivores are exposed to post-release monitoring equipment prior to release to allow them to acclimate to its presence.

R-9. Determining Appropriate Release Sites

Release sites are evaluated for health and other threats and for appropriateness for the species.

- a. The potential release site is evaluated for the presence of appropriate and adequate food sources.
- b. The area is evaluated for potential health concerns.
- c. The potential release site is surveyed to ascertain whether any wild monotremes, marsupials or small insectivores are present, either permanently or seasonally.
- d. The area is evaluated to establish carrying capacity for monotremes, marsupials or small insectivores to be released. This includes taking into consideration others releases that may have already taken place and issues of territoriality. Animals are released in an appropriate habitat where carrying capacity for the species has not been reached.
- e. The area is evaluated for instances of potential human-wildlife conflict.
- f. IUCN guidelines are, in as much as possible, followed when determining release sites for rehabilitated monotremes, marsupials and small insectivores.
- g. Animals are released away from areas where there is potential for or has been a history of human-animal conflict.

R-10. The Release Process And Post Release Monitoring

Monotremes, marsupials and small insectivores are supported as needed to adapt in their new environment and are monitored post release.

- a. Once it is determined that the monotremes, marsupials and small insectivores have the basic skills for foraging in their new environment, supplemental care is discontinued.
- b. A post-release monitoring program is in place to ensure the rehabilitation program is providing the animals with the skills necessary to survive, that the habitat is adequate and that, as is species appropriate, animal have integrated into the wild.
 - Use of radio and satellite telemetry is recommended whenever possible and species appropriate.
- c. Ideally, monotremes, marsupials and small insectivores are returned to the wild using a soft release process wherein they are housed in an enclosure within the release area or spend time with



caregivers in the release area where supplemental food may be provided as needed and observation of their acclimatization may be observed.

- d. Post release monitoring, in conjunction with outside veterinary and scientific personnel, continues for a minimum of one year.
 - Level of monitoring may decrease over time as monotremes, marsupials and small insectivores are determined to be acclimating to the environment.
 - Longer term monitoring of the animals and their impact on the habitat is preferred.
 - Practices used and results obtained, both positive and negative, are shared both within the facility and with others involved in monotreme, marsupial and small insectivore reintroduction to aid in the continued improvement of the program.

Appendix 1

General

The monotremes, egg bearing mammals are comprised of the echidnas and the platypus. The platypus is largely aquatic and must have appropriate access to water for swimming. All monotreme species burrow. Largely solitary, the monotremes may be housed in small groups provided the space is large and varied enough to allow all animals to be solitary as they chose.

The marsupials, from kangaroos to wombats to possums, are mainly found in Australia and South America, with one species, the Virginian opossum, found in North America. There is tremendous variety in the habitats and natural histories of these species. Tree dwelling carnivores and arid land grazers are found in this group, with corresponding variation in their needs when maintained in sanctuary.

The insectivores – hedgehogs, moles, shrews, tenrecs, sloths, armadillos etc. – tend to be shy and secretive. They are often viewed as pest species because their burrowing activities damage property.

Enclosure Furnishings/Enrichment

Decaying logs, and the insects within, may provide enrichment for small insectivores

Logs and leafy branches provide extra roughage, enrichment and additional privacy for marsupials.

Hanging plant holders with moss may be used as hiding places for gliders.

Cardboard tubes or pvc pipes may be provided to kultarrs.

Thick ropes may be hung in the enclosure of possums.

Tasmanian devils benefit from old stumps/logs large enough to hide in, a climbing apparatus, perching points for viewing outside the enclosure and a water source for bathing/swimming.

Contraception Information

Single sex groups may be considered, based on social structure of the species involved. Naturally solitary species may be maintained alone or in single sex groupings.

Vasectomy has been used in some marsupial species.

Hormone disruptors are being tested for use on possum species.

Female contraception may be considered for some macropod species: GnRH Agonists - Gonadotropin Releasing Hormone Agonists, synthetic progestins and surgical sterilization are all potential methods.

Behavioral/Psychological Well-being

Signs of stress in monotreme, marsupial and small insectivore species

Possums:

- Constant paw cleaning
- Excessive drinking
- Lack of appetite
- Overly aggressive or submissive behavior
- Drooping of laying ears flush with the head

Bandicoots:

- Increased vocalization
- Escape attempts
- Reduced food intake
- Weight loss
- Poor coat condition or hair loss

Kultarr:

- Trembling
- Retreating into nest box
- Distress vocalizations
- Biting

Gliders:

- Loss of appetite and lack of thirst
- Diarrhea
- Pacing
- Lack of activity
- Biting

Koalas:

- Not sitting in trees, coming to ground and walking around
- Continuous ear flicking
- Hiccups, low whining vocalization
- Alarm posture
 - Wide eyes
 - Ears forward
 - Spine held vertical