

Name: _____

CARING FOR INJURED NATIVE REPTILES

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USEFUL ADDRESSES AND CONTACTS

Wombaroo distributor: Carol Baimbridge

Local Wildlife officer:

Other contacts

1. Local snake handler:
- 2.
- 3.

INTERNET SITES OF USE

<http://www.users.on.net/wombaroo/>
<http://www.vetafarm.com.au>
<http://www.wires.au.com>
<http://home.vicnet.net.au/~wildnet/>
<http://www.npws.nsw.gov.au/>
<http://www.dpiwe.tas.gov.au>
<http://www.dse.vic.gov.au/>
<http://www.ozark.wild.net.au>
<http://www.wrin.asn.au>

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INTRODUCTION

In the past, the only good snake was a dead one according to our society. This attitude is fortunately changing. However, we do see that many wildlife carers are attracted to the cute 'furrries' with the big eyes and do not consider that reptiles have a value in rehabilitation and have needs as specialized as a ringtail, a tawny frogmouth or a joey. However, you are one of the special wildlife carers who see differently to be attending this course. You realize that we can and should provide the same level of care and expertise to this diverse group of amazing animals as we do to other species.

Part of the reason for all the bad press on reptiles is that some – the venomous snakes are highly dangerous. Unless you have attended a venomous snake handling course you should not be participating in the rescue and relocation of these animals. It is prudent to know when to let the expert come in. It is important that you network in your area to find a qualified snake handler. I recommend that you make contact with such a person before you need to!

In the unfortunate event that a person is bitten by a venomous snake, the following first aid procedures should be followed:

1. Apply a broad constrictive bandage to the site of the bite and as much of the limb as possible. It should be as tight as you would apply a bandage to a sprained ankle. Immobilize the limb by placing it in a splint or sling.
2. Reassure the patient – it is important to keep calm.
3. Bring transport to the victim and proceed to the nearest hospital.
4. Do not wash the site – the venom on the skin assists in identification of the snake.

This brings home the importance of being able to identify snakes. It is a good idea to know the species likely to be seen in your area. If in any doubt – do not approach but seek expert assistance.

It is important to find a vet that is comfortable dealing with reptiles (and wildlife). There are a number of resources available to vets who want more information on reptiles. The zoos, unusual pets group of the AVA and experienced reptile vets can all provide assistance. For carers there are a number of email discussion lists. Please respect the vet's time: make an appointment, and try for the less busy times of the day.

ZOONOSES

As we talk about the envenomation that snakes are capable of, it is important to remember that all wild animals that we come in contact with have the ability to transmit some of their diseases to us. Psittacosis in birds, and infected bite wounds from possums are two examples.

Salmonella and *Pseudomonas* are bacteria that live on the skin of many reptiles. In humans Salmonellosis can cause diarrhoea, fever and joint infections. People that would be considered at risk are children, the elderly and the immuno-compromised. If you become unwell after handling wildlife, please seek medical assistance. Prevention is the best cure: always wash your hands after handling reptiles (and other animals).

Monitors, being carrion eaters, have particularly nasty bacteria in their mouths and if bitten, you should immediately seek medical assistance.

BIOLOGY

Whereas we often provide training based on one species, or even one genus of animals, when we talk about providing reptile care we are attempting to cover an entire phyla. Reptiles occur in all environments in Australia (including the Alps) and are found in water, in trees, on and under the land.

Reptiles have a number of features that are unique to them.

1. **Scales.** Over time, the skin has folded to become hard like our finger nails. These scales are shed (sloughed) to allow growth on a regular basis. In turtles, the scales have fused with the ribs and backbone to create a shell.
2. **Skeleton.** The skeleton of reptiles varies from the flexible long spine of snakes to the fused shell of the turtle. Some lizards (skinks) are able to break off their tail to escape a predator. The tail can regenerate, not as bone but as cartilage. Other skeleton changes include the unfused head bones of the snake permitting it to swallow a large meal.
3. **Respiration and circulation.** Reptiles do not have a diaphragm like mammals and thus are unable to cough. This predisposes them to pneumonia. The heart does have 4 chambers but the division between the bottom heart chambers is incomplete (so functions as 3 chambers). This allows the animal to not send blood to the lungs when it is not available (such as diving in turtles).
4. **Urinary system.** Reptiles, especially from arid environments excrete some of their urinary waste as a solid (**urate**). You will see brown faeces, white urate and a small amount of urine when the animal toilets.
5. **Reproductive system.** A softer, more rubbery egg is laid compared to a bird. The male's genitals are contained within the abdomen and the penis, (or more accurately, **hemipenes**) are held in pockets either side of the cloaca (common opening of the gut, kidney and reproductive tracts) in lizards and snakes.
6. **Nervous system.** The small brain of reptiles is well-protected by a thick bony skull. Eyes are well-developed and can see colours. They have a good sense of smell and can taste-smell using the Jacobson organ on the roof of their mouth.

THERMOREGULATION

Reptiles are ectothermic – they rely on their environment to provide heat for them to keep their body warm. For example: if you, a human, are placed in a cold room, your body temperature will not fall. You will start to practice a range of behaviours to maintain your body heat (shiver, rub your arms, metabolise fat and protein for energy to keep warm. A reptile does not have this range of behaviour and will drop its temperature to that of the room.

This helps us to understand some important concepts.

1. **Preferred body temperature (PBT).** All reptiles have a range of temperature at which they can best function. It is in this temperature range that all metabolic processes occur. This includes muscle function, digestion, growth, reproduction and importantly, the immune system. If the reptile is held outside that range, it is unable to perform these body functions. The end result is that the food rots in the guts setting up the release of bacteria into the blood. The immune system is unable to fight the bacteria and the animal succumbs slowly to the bacterial infection. You must know the PBT of the reptile you are caring for to provide it with the best temperature for it to heal and repair. Some temperatures for common species are shown below. If the species that you have in care is something different, the best temperature to house it at is a range is that of the area in which you live. As vets, we see herpetologists holding tropical species at temperatures up to 10°C below their normal range in the wild, with resulting problems.

SPECIES	TEMPERATURE RANGE (°C)
Turtle	20 - 26
Carpet python	29 – 33
Blue tongue lizard	28 – 32
Lace monitor	25 – 35
Shingleback lizard	33

2. **Brumination.** When the environmental temperature is too low to support normal body functions, the reptile can enter a state of inactivity called brumination. It is able to slow its metabolic rate. It will cease to move and feed and stay hidden until temperatures rise. This occurs in temperate areas of Australia. Occasionally, while hiding in this stage, reptiles are ‘found’ by children or the family dog. In the tropical areas, brumination does occur but relates to wet and dry seasons.
3. **Basking** is the behaviour that reptiles practice to raise their body temperature. We see reptiles on exposed rock, log, or the road (the long, long black rock). These reptiles will be flattened to increase the surface area contacting the warmth. Nocturnal reptiles do not bask in the sun, but absorb heat from warm surfaces. This suggests that for diurnal animals, it is best to provide a heat lamp (imitates the sun), and for nocturnal animals, an underground heat source (heat pad) or ceramic light is more appropriate.

SPECIES

Some species will be covered in the **Appendix 5**. They are chosen as an example of their type of reptile and as they are commonly represented in wildlife care. This is not meant to be an exhaustive list, nor replace the excellent texts that are available. This information is covered in a more general sense in later pages. However, it is designed to be a quick summary.

TYPES OF REPTILES

There are basically three orders of reptiles with different families in each group:

1. Turtles
 - a) Marine turtles (*Cheloniidae*)
 - b) Freshwater turtles (*Chelidae*)
2. Lizards
 - a) Geckoes – soft-bodied, nocturnal
 - b) Pygopodidae – legless lizard - wormlike
 - c) Varanidae – monitor/goanna
 - d) Agamidae – dragon lizards
 - e) Skink family – largest and most diverse family
3. Snakes
 - a) Boa family – includes python, non-venomous, muscular snakes
 - b) Colubrids – rear-fangs snakes represented by tree snakes
 - c) Elapids – front-fanged venomous land snakes
 - d) Acrochordidae – file snakes – aquatic snakes
 - e) Hydrophiidae – sea snakes – aquatic, potentially fatal
 - f) Laticaudidae – sea Kraits – aquatic, potentially fatal

EQUIPMENT

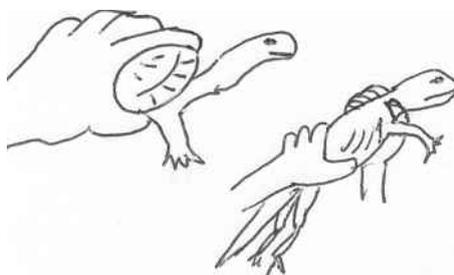
Below is a basic summary of equipment required to treat reptiles.

For rescue	pillow slip, carry box, safety vest, snake hook
For heating	Heating pad, lamp
For housing	plastic container, fish tank, reptarium
For feeding	syringe, crop needle, eye dropper, tweezers
Feeding bowls	plastic, ceramic, clear glass,
For first aid	tissues, swabs, cotton balls, vetrap, Elastoplast
For cleaning	iodine, salty water
For dressing wounds	Duoderm, Opsite, Silverzine
To eat	meat, mice, mealworms, crickets, vegetables
Wombaroo products	Reptile Supplement
Supplements	calcium liquid or powder

HANDLING

Wild reptiles are more likely to be aggressive compared to their captive cousins. Handling them will be stressful to them and may result in injury to them. Do not handle snakes after feeding for 3 days or they may vomit.

- **Turtles** are held over the top of their shell. You can hold them at the side where the carapace joins the plastron; however, their hind claws can scratch you and dislodge your hand. Turtles emit a smelly discharge from glands near the carapace as a defense mechanism. They may also attempt to urinate/defaecate on you. Be aware that you can cause serious damage to the turtle if you drop it. To top it all, they can bite!



- **Lizards** are held behind the head on their neck as they will attempt to bite. If they are small, this will also restrain their front legs. Support their back end with another hand. It can help to cover their eyes with a towel. This technique varies with the size of the lizard. If you do not support the lizard so that it feels comfortable, then it will struggle violently and attempt to twist out of your hands.
 - **Geckos** need to be handled gently to prevent damage to their skin.
 - **Monitors** can lacerate human skin with their tail.
- **Snakes** can be held firmly, directly behind the head. However this will aggravate even captive snakes accustomed to handling. Even domestic snakes do not like this technique of restraint. Snakes are often transported in bags – use this to cover the snake's head during examination. Jiggers or a pinning stick can be used to get the animal into a bag. Tailing is not recommended as some snakes can twist around and bite the handler. Do not handle venomous snakes unless you have been trained. Even then, another handler/observer should be present.



TRANSPORTATION OF REPTILES

The method of transportation should provide security from escape; prevent exposure to extremes of temperature and further damage.

A pillow case is often used to transport snakes. This should be placed inside a solid container to prevent accidental crushing. Ensure that there are no loose threads in the pillow case.

Small clear containers are suitable for most small reptiles. They should be lined with paper or another thread-free material to give some grip.

Larger reptiles can be traveled in a garbage bin that has small breathing holes. Such a garbage bin is also suitable for echidnas, koalas (without the lid) and most other types of wildlife.

Venomous snakes should be transported in a locked container and the contents clearly labeled with the species (you may be unconscious in the event of a car accident).

Turtles are agile climbers. They should be transported in a secure container. A cat carry cage is suitable. Line it with damp towels to provide moisture and a hidey hole.

HOUSING REPTILES

There are many different types of housing. Some carers will choose to specialise in reptiles and develop sophisticated housing. For most carers, we want to be able to adapt enclosures commonly used for other animals.

Types of housing

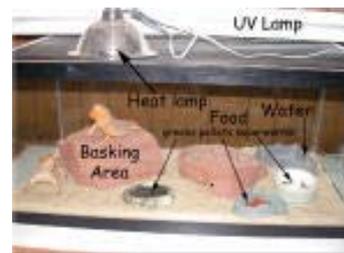
Outdoor housing, such as reptile pits are suitable for herpetologists. They provide access to natural sunlight and a semi-natural enclosure that permits the animal to show more natural behaviour. Ideas for outside enclosures include the use of pool liners, baths. Aviaries with wire should be avoided due to the risk of abrading the nose.

However, as we are dealing with sick or injured animals indoor housing with its ability to provide better temperature control is more suitable. Aim for simplicity in design for easy cleaning. A secure lid to prevent escape is required.

The enclosure needs to be large enough for the animal to turn around and for the furniture: water bowl, basking rock, hidey hole. The objective of housing wildlife is not for display, as with captives, but for comfort. Size recommendations are made in **Appendix 1**.

Indoor enclosures that may be used include:

- **Fish tank with lid**– come in a range of sizes, provide good visualisation of the animal. They do have a tendency to lose heat.
- **Wooden boxes** – used by most herpetologists provide a better temperature control. However, they are difficult to clean effectively.
- **Small plastic containers** are suitable for small or juvenile animals.
- **Storage tubs** come in a range of sizes and can be modified with breathing holes.
- **Reptariums** are available from pet shops and come in a range of styles from open mesh to turtle tanks with a dry area.
- Short-term enclosures could include carry baskets. However, most reptiles can escape through very small openings.
- Venomous reptiles should be housed in a secure, locked enclosure.



Turtle enclosures must provide a dry area for basking. This needs to be large enough that the turtle can get entirely out of the water. As turtles eat and defaecate in the water, a good quality filtration system is required. Do not skimp

on the size of this – bigger is better. A 25% water change should be performed weekly as a minimum. The water should be tested regularly. Turtles are sensitive to chemicals placed into domestic tap water. Use water ager products or expose the water to sunlight for 24 hours prior to use. Consider feeding in a separate tank to reduce the amount of food waste.

Heating the enclosure

It is important to offer a gradient of temperature in the cage. This is achieved by placing the heat source at one end of the enclosure. Aim to provide the preferred body temperature range within the tank. It can extend 1-2°C above/below the range – the most important thing is to provide a range of temperature so the animal can chose where it wants to be.

The temperature must be monitored with a thermometer. An inside/outside thermometer is available through Dick Smith/Jaycar/Tandy. The unit reads one temperature and the probe on a 30cm cord reads another. Some will also read humidity. The unit can be placed at the cold end of the tank, and the probe under the basking lamp to get an idea of the temperature gradient.

A thermometer is **not** a thermostat. A thermometer reads temperature. A thermostat maintains the temperature. It has sensors that can turn a heater on or off depending on the temperature. A thermometer is needed to check that the thermostat is producing the heat that you have asked it to do.

Check the temperature daily – heat lamps can blow and may not be identified without regular monitoring. The temperature in the tank will also change with the temperature of the room and day. Monitor where the animal spends its time and change the heating based on its behaviour. It is important that the animal cannot come into contact with the heat source directly as it may burn itself.

Table: Preferred Body Temperature for Common Species.

Species	Preferred body temperature (° C)
Eastern Long-neck Turtle	20 - 26
Diamond python	29
Carpet python	29 – 33
Green tree snake	32
Blue tongue lizard	26 – 33
Shingleback lizard	33
Bearded dragon	35 - 39
Gecko, pygopodid	24- 28
Lace monitor	32 - 35

Heating is provided by a range of sources:

- **Ceramic lamp.** This heats without emitting light. This should be the main source of heating.
- **Hot light.** These are often red or blue. They emit light and heat but are suitable to be left on at night. There are good quality but expensive ones available from pet shops. Supermarkets and hardware stores offer less expensive coloured lights.
- **Basking light.** This is another light again. It is often a clear or white light. It designed to heat a small area below it. It should be placed at one end of the tank.
- **Reptile rocks** should be avoided. They are associated with constipation. The animal does not move off them and the heat dehydrates the animal leading to a loss of water from the faeces. The reptile develops hot spots and may cause burns.
- **Heat pads**, as used for other wildlife species are suitable in the shorter term but may cause the same problems as reptile rocks. They are more suited to nocturnal reptiles such as pythons and geckos.
- **Aquarium heaters** are required to heat the water in turtle enclosures.

Light

Photoperiod should approach the normal day length. A white globe can be used to give lighting. However, fluorescent lights are often used.

A basking light should be offered above a basking rock. The basking light is often used to encourage the reptile to bask within reach of the UVB light, thus exposing the animal to the correct amount of UVB. The animal must be within 20 cm of the UVB light.

A UV B light is required by lizards and turtles to metabolise calcium. Without exposure to UVB, the animal is at risk of metabolic bone disease. Pet shops stock brands such as *Zoo Med Reptisun 5.0*. UVB lights should be replaced every 6 months of continuous use. They will still be emitting light, but not in the wavelength required.

Reptiles need to be exposed to normal sunlight twice weekly to make vitamin D. Take them outside in a secure container for 30 minutes twice weekly. Do not expose to full sun – offer shade and water to prevent overheating.

Humidity

Requirement for humidity varies with where the species comes from.

Coastal and tropical reptiles live in a humid environment for all or part of the year. Offer a large water bowl and move it to under the heat source to provide humidity. Foliage should be sprayed twice daily for tropical animals. A low humidity will cause problems in these animals with shedding.

Arid reptiles (such as the Shingleback) can be offered water only 1-2 times a week as they obtain their water from their vegetarian diet. High humidity leads to fungal dermatitis in arid species.

Cage Furnishings

It is important to keep furnishing simple. Avoid putting plants in the enclosure as they are a source of potential bacteria and will change the humidity.

- **Substrate** can be as simple as newspaper. Leaf litter, sand or pebbles are other choices. However, the emphasis is on easy cleaning. Ingestion of substrates is a complication of litter, sand and pebbles. These substrates are also a substrate for bacterial growth.
- **Furniture**. All reptiles need a place to hide. This is crucial for the reptile to feel comfortable (rather like a joey needs a pouch). A hollow log, bark, pot, rock ledge are all options. It can be as simple as a fold of newspaper or cardboard box. Hidey holes should be placed in both warm and cool ends of the cage. Tree-living animals (pythons, dragons, monitors, geckos) need branches to climb.
- **Water bowls** should be heavy and not able to be spilled. Fresh water should be offered daily. Glass or ceramic are suitable materials

Hygiene

This is important for reptiles too! Remove dead skin, faeces and leftover food daily. Use agents that are effective at neutralizing the microbes, but are safe for the reptile. Use at the concentration recommended by the manufacturer.

Suitable agents include:

- bleach (*White King*)
- quaternary ammonium compounds (*pine-o-clea*, *Aviclens*)
- F10 – a new agent that kills viruses, bacteria, fungi and spores.

FEEDING REPTILES

NUTRITION

Each species has different requirements for food. Some suggestions are made below as a guide. See appendix 7 for examples of diets in different species.

- Supplement food with **Wombaroo Reptile Supplement**.
- Calcium should be added to the diet 1-3 times a week. Young animals require more calcium. Calcium powder can be used. However, more calcium can be absorbed in the liquid formulation, **Calcium Sandoz** at 1ml/kg.
- Only feed reptiles when they are housed within their preferred temperature range. Do not feed cold reptiles.
- Wild reptiles can be hard to feed as they are accustomed to catching live prey. They may eat dead food if you can wave food in front of them at the end of blunt tongs or tweezers. Feed them at night as most are nocturnal. Do not feed live prey that may injure the reptile (e.g.: rats, mice). This practice is illegal and is an animal welfare issue.
- Most young pythons do not eat mammals in the wild. They eat small lizards and frogs. However, these are often also native animals and it is illegal to

- feed these wild-caught animals as they are protected by the same law as the reptiles!
- Sources of captive diet items include pet shops and bait shops. Pet shops stock a range of dragon and turtle food. Consider establishing your own breeding colony of mealworms, crickets, mice or rats. Ensure the food is well-fed itself! Gut-loading is practiced for mealworms and crickets fed out – this entails feeding the insect a diet high in greens and calcium for the week prior to being fed to the reptile.
 - Rodents should be frozen for 30 days to kill internal parasites. Thaw slowly in warm water. Do not microwave. The hot spots could cause damage to the gut.
 - Feed at a time that the animal would eat in the wild – night or day. Young pythons in particular do not feed in the day as they feel vulnerable themselves to predation at that time.
 - If the animal is not comfortable in its enclosure it is less likely to eat.
 - Food items such as crickets, mealworms and rodents can be grown at home as described in **Appendix 4**.

The frequency to feed reptiles is tabled below. This will vary with the age of the animal, with younger and smaller reptiles being fed more frequently. If animals are overfed, they will become obese.

Table: Frequency of Feeding Reptiles

group	Age of the animal	Frequency of feeding over 7 days
turtle	juvenile	7
	adult	3
Lizard - skink	juvenile	7
	adult	2
Lizard - dragon	juvenile	7
	adult	3
Lizard - monitor	adult	1
snake	juvenile	3
	adult	½ to 2

FEEDING TURTLES

Freshwater long-neck turtles are carnivorous. They must be fed in the water.

Offer: mice, yabbies, shrimp, worms, insects, fish, pellets made from Reptile Supplement (Wombaroo), commercial turtle pellets.

Do not offer red meat only (it will cause a calcium deficiency) or dog food as it will cause gout and kidney failure.

Short neck turtles do eat water plants as well as being carnivorous.

FEEDING LIZARDS

The **large skinks** (Bluetongue, Cunningham, and Shingleback) are omnivorous.

Offer: chopped fruit, vegetables, boiled egg, snails, mealworms, crickets, snails, galleria grub, and fly pupae.

Vegetables include beans, carrot, alfalfa sprouts, parsley, raised, figs, oranges, melon, dandelion, apple, banana, orange, grape, broccoli, melon, and currants. Juvenile skinks are more carnivorous.

Dragons are mainly insectivorous.

Offer crickets, silkworms, mealworms, moths, and hairless mice.

A calcium supplement is required.

Monitors can be fed on small mammals such as rats, birds (chickens, quail), fish and raw meat, supplemented with a mineral supplement.

Geckos, small skink species and pygopodids are insectivorous.

Blind Snake eats insects (ants, termites) only.

FEEDING SNAKES

All snakes are carnivorous.

Offer: rodents are commonly fed. Some species eat frogs and skinks in the wild and will take some time to recognize a dead mouse as food. The smell of a dead skink may need to be rubbed over the mouse to encourage the snake to recognize it as food.

RECORDS

Besides the records that we need to keep as part of holding wildlife under rehabilitation licenses, records should also be kept that show the following:

1. **Feeding** – what was eaten and when.
2. **Temperature** of the enclosure when fed
3. **Defaecation** – note when and how it appeared
4. **Ecdysis** – when occurred and any problems
5. **Treatment** – what and when administered, at what location, progress with condition
6. **Body weight** – performed weekly.

These records assist with us the next time we have a reptile in care. As reptiles present into care seasonally, it may be six months or more before the next one presents which is plenty of time to have forgotten what you did well before!

RELEASE

Requirements for release

These are outlined below:

Successful rehabilitation.

Several criteria must be met. The animal must be:

- A suitable weight for its age, sex and species
- Able to find, catch, manipulate and process suitable food items.
- Show the behavioural traits of predator avoidance.
- Acclimatized to the weather conditions at the time of release.
- Fit enough to move around its terrain.
- Able to interact with the members of its own species.

- **Have recovered 100% from its injuries.** No lasting physical impairments should be present that will interfere with survival, (accepting that some impairment may be permitted in some cases).

Timing of the release

Nocturnal animals should be released on dusk.

Diurnal animals should be released in the early morning.

In southern Australia, reptiles may be held over winter until warmer weather arrives. This is to prevent a released animal not being able to find food, a hidey hole or avoid predators due to the low ambient temperature hindering its movements.

Hard release is often practiced in the case of reptiles.

Release site.

The release site should be given a lot of consideration.

Returning the animal to the original location is ideal. If this is not possible then the animal should be released into the correct habitat, in the normal distribution for the species, preferably where the same species has been seen. Enough food should be present at the location.

Animals should be released within 5km of the point of rescue and particularly for reptiles, aim for a shorter distance where possible. This is due to the fact that many reptiles have very small ranges and may not move 5km in a lifetime. It is occasionally necessary due to inherent risks at the original point of rescue – such as the family Jack Russell Terrier!

Discuss with property owners how to make their yard more reptile-friendly.

- Avoid using pesticides or snail bait.
- Leave rocks or use clay pipe to provide hidey holes.
- Avoid leaving pet food out as it lures lizards into the dog's territory.
- Plant low shrubs along the fences to help them move around the yard.

If the animal is territorial, it should be released into its own territory.

Many reptiles, such as snakes and lizards will attempt to return to their original territory. This places them at greater risk of vehicle trauma or predation if released a distance from their original location.

EUTHANASIA

All animals are entitled to a quick, pain-free method of euthanasia. The gold standard is a barbiturate overdose performed by a veterinarian. However, even this method will not cause instantaneous death due to the slow metabolic rate. The heart beats slower and so the euthanizing solution takes longer to reach the brain and cause depression of the breathing centre. Particularly in turtles, death may take up to one hour due to their ability to alter their circulation.

If required in the field, reptiles can be stunned with a blow to the head and then the skull crushed. Freezing does not kill them quickly and causes a lot of pain.

DISEASES OF REPTILES

HISTORY

Get an accurate history, with an accurate address. Find out if the animal has been held for some time, and how it might have been housed and fed.

PHYSICAL EXAM

It is important to know what normal is to understand the abnormal.

The mouth is often difficult to open. Open the mouth by gently pulling the loose skin below the jaw. The mouth can be pried open with a solid flat object (not metal as it damages teeth) such as a spatula or pencil.

By the time that we get to a physical exam, it is expected that you have performed a distant examination – possibly at the site of rescue. This is where we look at the animal and watch it before we touch it. Do not underestimate the value of the distant examination. It is while the animal is not confined that you can assess lameness, normal breathing, alterations in balance and demeanour. A good distant examination allows you to focus on the affected area in your physical exam, and thus shortens this exam and the stress it causes.

As with other animals, it is a good idea to examine reptiles while restrained in a pillow or bag. The part that you are interested in can be examined while the rest of the animal remains in the bag. This is much less stressful for the reptile.

Often the problems that are present are very subtle – such as a puncture mark or not using a leg normally.

As with other wildlife, there is the ever-present conundrum: was the animal unwell and thus it was susceptible to accident, or was it simply having a bad day – in the wrong place at the wrong time? Hopefully, the physical examination will help to answer this.

Table: Comparison of Normal and Abnormal Findings on Examination.

Organ	normal	abnormal
Demeanour	Bright, alert responsive	Depressed, comatose
Nose	Clear, breathing not audible	Discharge, noisy breathing
Eyes	Open, clear, respond to light	Closed, dull, opaque, discharge
Mouth	Pale pink	Swelling, scabs, lumps, red
Legs	Weight bearing, same length, toes present	Lame, short leg, missing toes, swollen toes
Body		Swellings, abrasions, lacerations
Cloaca	Pink, no discharge	Red, swollen, diarrhoea, prolapsed tissue
Condition	Feel muscle around spine and tail feels fat	Prominent spine, thin tail, thin under shell
Tail	Free of abrasions,	Swellings, abrasions,

COMMON TRAUMATIC PRESENTATIONS

Trauma

Causes: Cars, whipper-snippers, garden tools

Clinical signs:

Head injuries: look for cracks, symmetry. The jaw must be accurately aligned to eat. Bone infections from exposure to mouth bacteria could occur.

Limb fractures: not using leg, swollen, limb is deformed.

Spine fractures and paralysis often warrant euthanasia. The damage is often more extensive than what is visible from the outside. Usually a wound is seen in close proximity to the spine.

Tail damage – assess for sensation and bleeding.

Diagnosis: Radiography performed by the veterinarian is required to diagnose the extent of the fracture.

Treatment: For all trauma cases: clean wounds to reduce contamination
Antibiotics for open wounds due to the nasty skin bacteria!

Opsite is a clear waterproof dressing that allows healing.

Apply a layer of **Duoderm** under the **Opsite**

TREATMENTS FOR DIFFERENT TYPES OF TRAUMA

Leg fractures

Cage rest

External splint on leg changed fortnightly

Supplement diet with calcium

The leg may need to be pinned by the veterinarian.

Heal over 3 months.

Tail fractures

Some lizards will regrow the tail but will not be the original length or colour. Clean and leave as open wound.

Spine fractures

Confine with cage rest.

Treat open wounds near spine with antibiotics

Poor prognosis – monitor for voluntary movement over 4 weeks. If no improvement by then, euthanasia is recommended.

Rib fractures

If several adjacent ribs are broken, the snake may not be able to move food down its gut. Euthanasia may need to be considered.

Shell Fractures

Cause:

Hit by car often as emerging in spring from aestivation

Clinical signs:

Cracked or missing shell.

More serious internal injury may not be apparent.

Broken pelvis, legs, shoulders and pneumonia occur.

Treatment:

The severity of damage needs to be determined using radiographs performed by a veterinarian.

Antibiotics are required for 4-

6 weeks.



The shell should be cleaned with iodine to prevent infection. The vet will attempt closure once infection has cleared. It is no longer considered appropriate to use fiberglass. Tissue-friendly products should be used. The aim of closing the fracture should initially be to provide waterproofing so that the animal can swim and eat; and provide stability of the fragments to promote healing.

Predation and Soft Tissue Wounds

Causes: Cat and dog bite wounds
Humans inflict damage from humans when they find a reptile while gardening or driving. A blue-tongue lizard stripes look very much like a tiger snake markings!

Clinical signs: puncture wounds on skin from cat teeth or claws
Deeper and tearing wounds occur with dog bites.

Treatment: Severity of wounds needs to be assessed. Euthanasia may be indicated.

Wounds may need dead tissue to be cut away under anaesthesia.

Bathe wound in iodine diluted 1:10

Flush wound with saline.

Give antibiotics for a minimum of 10 days.

Recommend radiographs to diagnose extent of internal damage.

Dress wounds with Opsite and change each 2-3 days.

Use **Silverzine** or **Duoderm** on the wounds.

Delay closure until infection has cleared.



Prognosis is dependent on extent of damage to internal structures.

Some soft tissue structures are important:

- **Tongue injuries** – snakes and lizards use these for taste and location of prey.
- **Cloacal injuries** – potential for damage to the genital organs in the male.
- **Roof of the mouth** – location of Jacobson organ used for taste/smell.
- **Evisceration** can occasionally be treated if seen promptly. However contamination of the gut by foreign material leads to infection.

Internal Parasites

Cause: Reptiles will enter care with their normal parasites. However the stress of captivity may increase the numbers of parasites in the host to the detriment of the animal.

Particular endoparasites of concern are roundworms, motile protozoa and Coccidia.

Clinical signs: Weight loss, not eating, quiet
Loose faeces.

Diagnosis: Faecal flotation performed by a vet

Treatment: Worms are treated by Ivermectin 0.2mg/kg by mouth. This drug is toxic to turtles and should not be used in this species.

Panacur 25 at 25-50mg/kg by mouth is also used for worms.
Protozoa are treated with Flagyl 40mg/kg once.

Lumps under skin

Possible causes: 1. Worm cysts (sparganosis)
under skin in frog or lizard-eating snakes

2. localized skin infections.

Clinical sign Firm small lumps under the skin

Treatment A vet can remove these under
anaesthesia.

However, they can be left
without causing harm to the animal.

Worm with **Praziquantel** (tapewormer)
at mammalian dose rates.



External Parasites

Cause: Mites, ticks

Clinical signs: Rubbing body of cage furnishings
Spending most of the day in the water bowl.
Small pin head sized brown dots seen around face.
Blood loss may cause weakness and inappetance
Difficulty shedding in snakes

Treatment: Remove ticks manually
Clean the cage out – thoroughly and dry in sun.
Spray cage with Top of Descent spray.
Dispose of cage furnishings.
Wipe Frontline spray over the animal.

Prognosis Difficult to remove as the cage may be difficult to clean.
Be wary of using Organophosphates and pyrethrins as these
are associated with tumors in reptiles.

NON-TRAUMATIC PRESENTATIONS

Relocation

Cause: Many people just do not want reptiles in their yard.
Dog may have killed reptiles in the yard.

Plan: Discuss this with the member of public. This is an opportunity
to share the wonder of sharing our world with nature. Part of
wildlife rehabilitation does involve education of the public!

Treatment: Relocation to a suitable local area.
Seasonally, snakes may be moving through to seek water,
mates or new territory. These animals do not need to be
moved and will often be unable to be found 24 hours later as
they have moved on.

Captive Escapees

<u>Cause:</u>	Reptiles are brilliant escapees being able to escape from the smallest holes. Holding exotic species may be illegal. Unfortunately these people tend to let the animal go, rather than face the fines for holding the animal.
<u>Clinical signs:</u>	Native reptile out of its natural range Exotic to Australia reptile species Found in a residential setting: parks, street
<u>Treatment:</u>	Some captive escapees will be microchipped, so present the animal to the vet for microchip scanning. If the animal is exotic to Australia, contact the relevant wildlife agency. These animals can and do carry exotic diseases that are deadly to our native species. If captive animals are released, there is a possibility that they will not survive, or may transmit diseases to the native population.

Reproductive problems

<u>Cause:</u>	Occasionally a female (often blue tongue lizards) is interrupted during the act of birthing. The resulting shock interferes with the lizard's ability to give birth.
<u>Clinical signs:</u>	Partial delivery of live young. Dead young born A distended cloaca and straining without progress.
<u>Diagnosis</u>	Radiographs determine presence of further young.
<u>Treatment:</u>	Supportive – get the reptile warm and rehydrated. Provide a quiet, secure enclosure with a hidey hole. Calcium sandoz is given by mouth at 1ml/kg. Oxytocin injection to promote contractions can be given by the veterinarian.

Orphaned young

<u>Cause:</u>	Young appear in backyards and are perceived to be orphaned by the general public. However, many young are born live (especially in lizards) and most reptiles have minimal parental involvement. These young animals are independent.
<u>Clinical signs:</u>	Small animals, often thin as not predated well
<u>Treatment:</u>	A decision to release them can be made individually. Holding the animal until it is more predator proof by being a larger size is also warranted. Ensure the area is free of predators with sufficient food and hidey holes.

HUSBANDRY DISEASES

As we often hold reptiles for extended periods due to the long time it takes them to heal, diseases due to husbandry may become apparent. Over-wintering an animal that comes into care at the end of summer is also practiced.

NUTRITION-RELATED PROBLEMS

Stomatitis

This is a mouth and gum infection in snakes and lizards.

Cause: Stress, soft diet, vitamin C deficiency

Clinical signs: Red gums, teeth may be lost,
white plaques on gum
Jaw bone may be visible.

Treat: Antibiotics until the infection is cleared (2-3 weeks)

Mouth cleaning performed weekly with dilute **chlorhexidine**.

Prevention: Abrasive foods (chunks of vegetables such as carrot, broccoli) should be offered. Do not cut the food up too finely.



Biotin Deficiency

Cause: Seen in monitors fed raw egg only.
The enzyme avidin destroys biotin.

Clinical signs: The monitor has muscle weakness.

Treatment: Monitors need a varied diet in captivity.
Supplement diet with rodents and chicks
Supplement with vitamins.

Vitamin A Deficiency

Cause: Seen in turtles fed a diet of raw meat or lettuce.

Clinical signs: Swollen eyelids, not eat, depression, death,
Abscesses in the mouth of turtles.

Treatment: Vitamin A injections.
Improve diet and feed appropriately for the species.
Supplement diet with multivitamins.

Anorexia

Cause: Temperature too low, not recognize item as food.

Clinical signs: Lethargic, cold, not interested in food

Treatment: Increase temperature into the PBT range.
Have a basking area a few degrees above PBT.
Warm the prey item.
Consider force feeding.

Prognosis: may be a sign of an underlying problem. If no improvement with increased temperature, the animal should receive veterinary attention.

Gout

Cause: Reptiles fed a high proportion of dog or cat food
Antibiotics (such as Gentamicin) that are toxic to the kidney,

Clinical signs: occurs in two locations:

- Visceral gout (gout affecting the organs): not eat, dehydrated, lethargic
- Articular gout (gout affecting the joints): swollen joints, lameness, quiet.

Treatment: Give fluids to flush the toxic compounds from the body
Reduce protein in diet. Remember that many lizards are vegetarian/omnivores – not carnivores

Prevention: Do not feed dog or cat food to reptiles.
Ensure all reptiles receiving antibiotics are correctly rehydrated.

Metabolic Bone Disease

Also known as rickets. The dragon lizards, especially the bearded and water dragons are more likely to suffer from this condition.

Cause: Seen in young reptiles on diets that are:

- low in calcium
- low in vitamin D
- Lack of exposure to natural sunlight or UVB.

Clinical signs: Fractures, swollen legs
Non-union of fractures,
Soft, deformed shells.
Paralysis; weakness;
Not eating or dead.



Treatment: Feed diet correct in calcium.
Give Calcium sandoz at 1ml/kg for 1- 3 months
Expose to sunlight for 20 minutes twice weekly
Change the UVB light. The light must be within 20 cm of the animal for it to work. This is done by encouraging the animal to bask closer to the UVB light by bringing the light closer to the reptile
Restrict movement to allow healing (no climbing).

HOUSING-RELATED PROBLEMS

Reptiles are totally dependent on the environment that we provide. If the environment does not provide for their requirements, they will reflect this by developing disease.

Dysecdysis

The reptile does not shed its skin normally.

Snakes should shed in one piece. It is normal for lizards to shed in several pieces over some days

Cause: Low humidity,
No abrasive substrate or furniture in the enclosure,
Systemic disease.

Treatment: Correct humidity by placing water bowl under the heat lamp.
Offer an abrasive surface such as a rock or log.
Soak in warm water for 1-2 hours.



Gently peel slough using a towel if scale not lifting by itself.
Do not be in a hurry to remove it all in one day.
Complication: If the eye scale (spectacle) does not shed it can be retained.

Toe Gangrene

Cause: Low humidity, crushing injury, fungal infection

Clinical signs: Toes appear dead
Toes are absent
Retained skin is present around swollen toes.

Treatment: Amputation of toes may be required to save the leg
Soak toes in dilute iodine.

Prevention: Antibiotics are required for 2 weeks as a minimum.
Correct humidity level.

Burns

Reptiles are better geared to gaining heat and have poor mechanism to identify that the temperature is too hot.

Causes: Unprotected lights in cages. Snakes in particular like to curl around them.

Lights are too close to the floor.
Unregulated heat pads under the floor.

Clinical signs: Reptiles burnt during bushfire.
Blisters or ulcers on the scale,
Sloughing of skin which may appear over a few days
Dehydration and death.

Treatment is intensive and long-term
Bathe in cool water – this will reduce the microwave effect of burns and immediately cool the animal's temperature.
Treat wounds with **Silverzine**.

Use **Opsite** or **Duoderm** to protect the wounds and promote healing. Change the bandage every two days.
Surgical debridement under anaesthesia may be required.
Give antibiotics for 2 weeks, or longer as required.
Fluids are required to combat fluid loss from an open wound.

Complication: Scars may interfere with future sloughing.

Prevention: Use a wire cage around all heat fittings in the cage.
Check the thermostat works.
Do not forget to look for reptiles in wild fires.

Hypothermia

Cause: Failure in heating
Heating provided, but below the PBT.

Clinical signs: Placing in a freezer as a method of restraint or anaesthesia
Respiratory discharge.
Discharge from eyes.

Not eating, due to inappropriate fermentation of food.
Loss of digits due to frostbite.
Treatment: Slowly warm the animal to PBT over 3 hours.
Antibiotic course may be required to treat infection.

Prevention: Monitor the cage temperature daily.

Scale rot

Cause: Fungal infection occurs with high humidity, moist substrate,

Treatment: Debride affected areas with diluted iodine daily.
Antibiotics such as **Baytril** may be required.

Shell rot

Also known as shell cutaneous ulcerative disease

Cause: Abrasive cage furniture traumatizes the skin

Poor water quality permits bacteria to damage the shell

Clinical signs: Circular areas (ulcers) where the skin is lost on the shell.

Areas may appear red or brown compared to surrounds.

Treatment: Antibiotics such as Baytril which has a good spectrum for the bacteria likely to be found on skin can be used.

Allow the shell to completely dry out for 1 hour a day.

Daily application of diluted iodine to affected areas.

Prevention: Monitor water quality in the tank on a weekly basis.

Ensure filtration unit works well and clean regularly.

25% water change weekly.

Remove abrasive furniture.



Nose Abrasion

Cause: Animal rubs its nose (rostrum) on cage walls while attempting to escape. This is common in wild reptiles.

Wire aviaries can cause a great deal of damage.

Clinical signs: Skin on the lips and nose is abraded.

May develop into ulcers and lead to exposure of bone.

Treatment: Clean the area with iodine.

Apply a topical antibiotic ointment such as **Silverzine under Opsite**.

Prevention: Offer more hidey holes.

Cover the inside of the front of the cage with cardboard.

Have the enclosure in a quiet, low-traffic part of the house.

Remove abrasive surfaces from the enclosure.

Inclusion Body Disease

In 1999, a group of exotic snakes were brought into the country and impounded by the authorities for 12 months. Inclusion body disease was diagnosed in some after the quarantine. It is thought that these snakes entered amateur herpetologist hands and thus exposed native snakes. In some parts of Australia, this disease is seen commonly in captive-held snakes. It is only a matter of time before we see this disease in native snakes.

Cause: A virus invades the brain in python species.

Clinical signs:

Quiet, chronic regurgitation, subtle head tremors, slow ability to right themselves.

Treatment:

None. Euthanasia and dispose by incineration.
Send brain samples to Wildlife Pathology Register at Taronga Park Zoo.

APPENDIX 1

HOUSING REQUIREMENTS FOR REPTILES

Taken from the Victorian Code of Practice for the Rehabilitation of Wildlife

Type of Animal	Minimum floor area (cm ²)	Maximum number of animals	Minimum height (cm)	Increased floor area for each additional animal (cm ²)
Tortoises				
up to 10cm length	1,600	1	20	400
over 10cm length	20,000	1	20	10,000
Snakes				
Small terrestrial of <60 cm in length eg. adult Little Whip or juvenile Pythons	1,800	2	30	900
Less than 1.2 metres in length eg. Children's Python, Tiger, Copperhead	4,000	2	50	2,000
Less than 2.5 metres in length eg. Eastern Brown, Taipan King Brown	15,000	1	120	7,500
Tree snakes up to 1.2 metres in length	4,800	2	80	2,400
Large Pythons up to 2.5 metres in length eg. Diamond, Carpet, Water, Amenthystines	20,000	1	150	10,000
Note: Snakes longer than 2.5 metres require a minimum area of half their length squared				
Lizards				
Skinks, Dragons, Water Dragons	10,000	1	100	5,000
Goannas	45,000	1	200	20,000

From Revised Code of Practice for the Welfare of Wildlife during Rehabilitation, DNRE, 2001

APPENDIX 2

DRUG THERAPY IN REPTILES

FLUID THERAPY

Fluids can be administered to dehydrated snakes. Dehydration is recognized in the same way as it is in other species.

5% Tacky mucus membranes.

10% Skin tenting and decreased elasticity, glazed eyes.

15% Skin stays folded, depression, coma.

The most effective way to rehydrate reptiles is to use a warm water soak. Fresh water should be offered daily. The water should be warm (not cold from the tap). The water bowl should be large enough for the entire body to be submerged. The bowl should be shallow to prevent drowning in a weakened animal. In many instances, if you offer the water, the animal will rehydrate itself. You can place it in a water soak one or two times a day for 20 minutes.

Subcutaneous fluids can be given near the spine in lizards and snake. In turtles, they would be given into the body cavity.

INJECTION SITES

Due to the very efficient kidney circulation, all injections need to be given into the front half of the body to avoid them being excreted.

Intramuscular sites that are used are:

- Triceps muscle (the back of the upper arm)
- Spinal muscles on either side of the spine.

Some injections can be painful to administer. Dilution may be required. Where possible use the oral route as soon as possible.

DRUG THERAPY

Reptiles metabolise drugs slower than other animals due to a lower metabolic rate. The dose rate is lower compared to mammals and the frequency that it is given is reduced. The reptile needs to be housed within its PBT for it to metabolise the drug.

Doses are often very small as most reptiles that come into care are less than 2kg and dilution prior to administration is required to prevent inadvertent overdosing. Some of the drugs that work well in reptiles (Pipril and Fortum) are not commonly available in most vet clinics due to their price tag! Try to find a vet who deals in reptiles or birds to assist you with your reptiles.

ORAL ADMINISTRATION

This is safe and easy to perform. Drugs may be injected into food prey items. Snakes can be crop-tubed, similar to birds. Fluids, food and medication can be given via a syringe placed gently into the corner of the mouth of lizards. Turtles are medicated by injecting the drug into food or soaking the food in the medication. Only offer the medicated portion to start and the remainder of the food when this has been consumed.

APPENDIX 3

FORMULARY FOR REPTILES

	Generic name	Trade name	Dose rate	frequency	Treatment duration	How to give
antibiotics	Enrofloxacin	Baytril	5mg/kg	once	14 - 28d	By mouth
	Clindamycin	Antirobe		once	14days	By mouth
	Ceftazidime	Fortum	20mg/kg	Every 2 nd day	14 day +	
	Trimethaprim-sulfadimadine	Tribrisen piglet suspension	1ml/kg	Once daily	5 days	By mouth
antiprotozoal	Metronidazole	Flagyl	25mg/kg	once	Repeat in 3 days	By mouth
	Tolurazil	Baycox	5mg/kg	Once daily		
anti-inflammatory	Carprofen	Rimadyl, Zenecarp	2-4mg/kg	Once every 1-3 days	3-10 days	Injection, by mouth
	Ketoprofen	Ketofen				
	Meloxicam	Metacam	0.1mg/kg	Once every 1-2 days		By mouth
Antiparasitic agent	Ivermectin	Ivomec	0.2mg/kg	once	Repeat in 14d	By mouth
	Fenbendazole	Panacur 25	25-50mg/kg	once		By mouth
Antifungal agents	Iodine	Betadine	1% solution	Once daily	14 days	Onto affected area
		Silvazene		Once daily	Until healed	On skin
	Calcium	Calcium sandoz	1ml/kg	Twice daily	4 – 12 weeks	By mouth

APPENDIX 4: GROWING LIVE FOOD

MEALWORMS

Housing: solid plastic container such as an ice-cream container or plastic pet container. The temperature they prefer is 27 - 30°C. Below this and they will take longer to complete their lifecycle. Both the beetle and worm stage can be fed.

Substrate: pollard (type of wheat germ from stock suppliers), bran, wheat germ, polenta, bread crumbs could all be used. Mealworms also live well in the home compost bin, but are harder to get out of there!

Diet: green leafy vegetables – endive, Chinese vegetables, banana, apple, sweet potato and potato (whole or peelings). I tend to think of the mealworm farm as an indoor compost bin for vegetable scraps.

Problems: the quality of the food you feed impacts on the animal's health. Problems with the food will correlate to problems with the animal.

- Colony dies – due to cold or due to not feeding
- Fungal infections – fungal spores seen to spout on old food. This is due to poor ventilation, high humidity (due to too much food put in) or poor quality food fed to the mealworms. Remove the affected layer.
- No worms, but plenty of beetles – the colony is probably synchronized. Take some out and refrigerate for a week and start a new colony. I discourage refrigeration of mealworms to be fed out as you are decreasing the value of the food item.
- Do not feed exclusively to young reptiles as their chitin (external skeleton) can cause intestinal obstruction.

CRICKETS

Housing: garbage bin, plastic pet container. The substrate can be peat moss or vermiculite. Egg cartons provide a place for the crickets to hide. Water is offered as a moistened sponge or by spraying the food with water. A temperature of 30°C is suitable. Catch them into toilet roll tubes or wide-mouthed bottles.

Diet: green leafy vegetables as before, carrot, apple, other fruits, dog food can be fed.

MICE/RATS

Housing: an escape-proof container is needed. I would discourage fish tanks as they do not have good ventilation and ammonia builds up quickly in them. The wire enclosures are preferable. Avoid high temperatures. Fresh water is required at all times. Provide a hidey hole and an exercise wheel (we want fit food after all!?!)

Diet: a varied diet including pellets and vegetables is required. Avoid mixes (they only eat part of it) and avoid high fatty treats (bread, cheese, processed human foods).

It is considered that rats are less smelly and better value than mice as a pinkie rat is the size of a 3 week old mouse. Pinkie mice are a better size to feed smaller reptiles.

APPENDIX 5:

INFORMATION ON COMMON SPECIES

BLUE TONGUE LIZARDS

housing	60 x 120cm for 1-2 adults.
temperature	26 – 33°C
Cage furniture	Hidey hole, water bowl
diet	Live prey: crickets, mealworms, earthworms, moths, mice, roaches and snails. Vegetarian items: dandelion, native berries and flowers, hard fruit (apple, raisins) and vegetables (broccoli, peas, carrot, tomato)
Special requirements	Can be aggressive to other cage mates

BEARDED DRAGONS

housing	60 x 120cm.
temperature	37-40C, decreasing to mid to high 20's at the cooler end.
Cage furniture	Shallow water bowl, something to climb
diet	Live prey: crickets, mealworms and roaches, insects, earthworms, slugs, beetles, moths, spiders and yabbies. Salad ingredients to feed include dandelion, Chinese greens, spinach. Vegetables to offer include squash, zucchini, sweet potato, broccoli, beans and carrots.
Special requirements	UVB – exposure to sunlight

GECKOS

housing	Escape-proof container.
temperature	24 - 28°C
Cage furniture	Bark to hide under, mist enclosure with water spray, water bowl
diet	Insects, mealworm, cricket, moth
Special requirements	Handling may damage skin, nocturnal

PYTHONS

housing	Escape-proof container. Vertical as arboreal
temperature	29 – 33°C
Cage furniture	Water bowl for soaking, branches for climbing
diet	Mice, rats
Special requirements	Nocturnal, can bite

EASTERN BROWN SNAKE

housing	House in a locked container that is escape-proof. Horizontal as is terrestrial
temperature	24 – 28°C
Cage furniture	Flower pot to hide, water bowl for soaking
diet	Mice, rats.
Special requirements	Venomous. Handle with care after handling course. Nocturnal.

COMMON LONG NECK TURTLE

housing	Aquarium tank
temperature	Water temperature is maintained at 22 – 28°C using an aquarium heater. The water should be held at a pH 7 and be soft to moderately hard (150ppm).
Cage furniture	Dry basking area with basking lamp
Diet	Crickets, daphnia, fish, mice, shrimps, snails, worms, yabbies, heart and liver. Commercial foods to offer include fish flakes, trout and yabby pellets, as well as turtle food.
Special requirements	UV lighting, regular water changes and filtering.

APPENDIX 6

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Code of practice for the welfare of wildlife during rehabilitation

Introduction

1. The purpose of the Revised Code of Practice for the Welfare of Wildlife during Rehabilitation (the Code) is to ensure the welfare of animals undergoing all stages of wildlife rehabilitation. It also provides an ethical guide to wildlife rehabilitators on wildlife rehabilitation and outlines responsibilities of those involved. The Code is incorporated under the Prevention of Cruelty to Animals Act 1986.
2. Wildlife rehabilitation is defined as caring for injured, sick, or orphaned native animals and providing access to veterinary assessment and treatment where required, then nursing care and support, with the goal of restoring them to their natural condition and habitat.
3. For the purposes of the Code, wildlife is defined as any animal of a vertebrate species, other than humans or fish, which is indigenous to Australia or its territorial waters. It is an offence to keep pest animals (as defined under the Catchment and Land Protection Act 1994) and these must be humanely euthanased if brought to a shelter. Introduced species should also be humanely euthanased. Domestic animals such as dogs and cats must be taken to a pound.
4. All wildlife in the state of Victoria is protected under the Wildlife Act 1975. A Wildlife Shelter Permit (permit) is required from the Department of Sustainability and Environment (DSE) for the purposes of wildlife rehabilitation. Potential wildlife rehabilitators need to demonstrate that they have acquired appropriate training, either through accredited courses or recognised informal training seminars, or can show acquisition of the required knowledge through prior experience or employment.

Principles

1. Wildlife rehabilitation is generally viewed by the community as an ethical obligation to assist wild animals found in pain or distress, particularly if as a result of human interference (for example road trauma, pet predation, or oil spills).
2. The work of wildlife rehabilitators contributes to conservation through research, community education and promotion of a respect for animals. However, rehabilitation has limited benefit for biodiversity conservation, as the majority of animals treated in shelters are common species and low survival rates upon release have been reported for some species.
3. The primary goal of wildlife rehabilitation is to facilitate animal welfare both during the rehabilitation process and upon release. Animals must be euthanased if they are considered unlikely to recover sufficiently to return to the wild, or if there is uncertainty regarding a release site (for example, if the factors that led to the original condition were to pose an unacceptable risk to the animal again upon its release).
4. Animals should be returned to suitable habitat in the general vicinity from which they were collected (exceptions may be ocean going seabirds or migratory species). Habitats have a carrying capacity for particular species, and most occupied sites tend to function at capacity level. The relocation of wildlife to new areas is not permitted where there is the potential for genetic problems, the spread of disease, or competition for food and shelter with the existing wild population.
5. Captivity can place significant stress on wildlife. Extended periods in captivity can result in loss of survival skills, and the risk that the animal's living space in the wild will be occupied by another member of the species. Wild animals are opportunistic and new individuals will rapidly attempt to fill available niches. Wildlife rehabilitators should aim to release adult animals from shelters as quickly as possible. A life in captivity is not a reasonable option for rehabilitated animals, other than in exceptional circumstances.
6. The hand rearing of juveniles needs particular consideration. Hand reared animals may lack the survival and behavioural skills of those born in the wild, and may be disadvantaged when competing for food, shelter and territory. Juveniles do not have an established home range to return to when raised in captivity, and familiarity with humans and domestic pets can result in an increased susceptibility to predation.
7. Before attempting to rehabilitate an animal in an area where population reduction is currently authorised for that species, the long-term welfare of the individual must be carefully considered. The stress of the treatment must be justified in view of habitat suitability, resource availability and potential for future population management at the release site.
8. A wildlife rehabilitator should strive to achieve high standards of animal care through knowledge and an understanding of the field. Continuing efforts must be made to keep informed of current rehabilitation information, methods and regulations. Membership of animal welfare and wildlife rehabilitation organisations is encouraged.

9. To facilitate optimum results for animal welfare, rehabilitators are also encouraged to cooperate in the sharing of information and resources. Some shelters may have better facilities or experience with certain species, or there may be the opportunity to rehabilitate an animal elsewhere in the company of its own species.

10. Rehabilitators should acknowledge their limitations and enlist the assistance of a veterinarian or a more experienced rehabilitator when appropriate.

Case assessment

1. Upon collection, animals must be assessed accurately and without delay by a person who is knowledgeable in the particular requirements of the species (a veterinarian if possible, or an experienced wildlife rehabilitator). At all stages of the rehabilitation process, animal welfare should be the primary objective.

- Where the animal is found to be suffering from significant pain, distress, trauma or disease that cannot be relieved, it must be promptly euthanased.
- Where the animal would not survive without extended treatment or surgery, and is unlikely to recover sufficiently to return to the wild, it should be promptly euthanased.
- Where there is uncertainty regarding the suitability of a release site (see below for details) the animal should be humanely euthanased.
- If there is a reasonable expectation that the animal can be successfully rehabilitated and released to its own environment, the wildlife rehabilitator should ensure that he/she has the capacity to provide for the captive needs of the animal. For example, experience with the particular species, suitable housing, and access to species specific social groups where relevant.

2. Conditions which could preclude successful rehabilitation and release include:

- **Loss of limbs or function of limbs, including tails**
- Permanent vital sensory loss (hearing, sight, smell, feeding)
- Untreatable infectious disease
- Permanent damage to the nervous system
- Inability to adjust to temporary captivity
- Chronic ill health
- Imprinted behaviour patterns.

3. The following considerations are important when assessing a release site:

- The release site should be suitable habitat in the general vicinity from which the animal was originally collected. For instance, if an animal were found injured on a highway, an area of bushland adjacent to the highway would be a suitable release site.

Exceptions may be ocean going seabirds or migratory species.

- There should be an available home range for the animal upon release. The sooner an animal can be rehabilitated and released back to its own environment, the more likely its place within the home range will not have been reoccupied.
- If there are limited resources available at the release site (for example, due to large numbers of conspecifics or vegetation removal), the cost of release to the existing population must be justified in terms of competition for food and shelter.
- The factors that lead to the original injury or condition must not pose an unacceptable risk to the animal again upon release (for example, if there are unusually high numbers of introduced predators at the site).

4. Continual reassessment during the process of rehabilitation is required, to ensure it remains in the best interests of the animal and that eventual release to the wild remains likely. If it becomes evident during the rehabilitation process that successful return to the wild is unlikely, the animal should be promptly euthanased.

5. Exceptional circumstances where a threatened species is involved should be discussed with an officer from DSE.

Veterinary care

The Veterinary Practice Act 1997 precludes nonveterinarians from practising veterinary surgery or veterinary medicine. Wildlife rehabilitators may only administer first aid. In cases where veterinarians are not able to examine the animal directly, the permit holder should make every effort to obtain veterinary advice. Surgical procedures that would result in the animal being unreleasable are inappropriate (for example, pinioning, amputating, declawing, or debeaking), with the exception of threatened species which may be offered to a zoological institution for breeding purposes. In such instances, advice from a DPI officer should be obtained.

Euthanasia

Wherever possible, a veterinarian should carry out euthanasia. Euthanasia by barbiturate overdose must only be carried out by a veterinarian. In exceptional circumstances where a wildlife rehabilitator is required to perform emergency euthanasia, a method appropriate for the species and circumstances should be employed to ensure minimal pain and

suffering. If rehabilitators are not familiar with suitable euthanasia techniques for the particular species involved, every effort must be made to obtain expert advice in this regard.

Quarantine and disease control

Stressed animals are more susceptible to expressing and contracting infectious disease. It is important to prevent the spread of infectious disease amongst animals brought into captivity for the purposes of rehabilitation.

Upon arrival all animals should be isolated in geographically separate areas until their health status can be determined. Sick animals should be kept in quarantine conditions throughout the period of their rehabilitation. It is recommended that animals of different species are kept separate at all times.

Regular cleaning and disinfection with hospital grade disinfectant should be applied to enclosures and equipment. Areas known to be infected must be serviced last and should not drain into 'clean' areas.

Facilities for treatment, food preparation and washing of bedding should be separate from those used by humans.

Contaminated waste and carcasses should be disposed of promptly, hygienically and in accordance with local Council by-laws or community standards.

Zoonoses

A number of diseases can be transmitted to humans from wild animals. These diseases are called 'zoonoses', and some can be fatal. All wildlife rehabilitators should respect the potential for disease transmission and use sound preventative measures.

Some commonly occurring zoonotic diseases are: Ornithosis (Psittacosis), Salmonellosis, Tuberculosis, Leptospirosis, Yersiniosis, Pasteurellosis, Lyssa Virus, fungal and yeast infection (including ringworm and thrush), and parasitic skin diseases (scabies, lice and ticks).

Husbandry

Native animals in wildlife shelters have certain basic requirements if adequate welfare standards are to be maintained:

1. Food - clean and fresh, and the appropriate type, quality and quantity for the species.

2. Water - fresh and changed daily.

3. Protection from

- noise,
- disease,
- unnecessary human contact
- the weather.

During the hospitalisation stage, animals require protection from wind, rain and extremes of temperature and humidity (however, toward the end of the rehabilitation process some re-acclimatisation to outside conditions may be necessary).

- harassment by other animals and predation – contact, sight, sound and smell. If a wild animal becomes familiar with the sight, smell or sound of dogs and cats, it may not recognise them as dangerous once it is released.

4. Clean air - adequate ventilation, free from excessive dust, air-borne pathogens and noxious gases.

5. Security - mental and physical. A place to hide and avoid stressful experiences, including dark areas (particularly for nocturnal species), and a place to sleep and feed effectively. Enclosures must be escape proof and safe enough to prevent the animal from injuring itself.

6. Space - sufficient room to avoid initiation of "stress" behaviours. Refer to Minimum Cage Sizes in the **Appendix**.

7. Lighting - access to sunlight or 'natural' spectrum artificial light. The photoperiod should mimic external conditions.

8. Supervision - this is necessary to monitor and manage the case. Stress should be minimised, and ideally the animal should be unaware of the supervision.

9. Hygiene - daily cleaning of enclosures and feed and water containers. Regular water changes for aquatic species to prevent contamination of the animal's captive environment. Pens should be well drained.

Housing and enclosure design

Accommodation plays an important part in the rehabilitation process. Each case must be assessed individually, and a sound knowledge of the behaviour of the species is necessary in order to provide effective housing. This information should be sought at the outset.

Housing should be provided in such a way as to:

1. Fulfil the animal's needs throughout the shelter period.

2. Meet quarantine requirements.

3. Enable regular (daily) inspection.

4. Minimise stress and handling.

5. Prevent familiarity with domestic pets, and unnecessary human contact.

6. Allow rehabilitation in social groups if applicable.
7. Enable training for survival in the wild where necessary (eg. cage furniture to replicate elements of the natural environment).

The type of housing varies with the species and with the stage of rehabilitation. Two main types of housing should be provided at shelters:

1. **Hospitalisation** -where an intensive non-natural environment is required for more seriously injured animals. This housing should allow wildlife to stretch out comfortably, but restrict their activity enough so it is not necessary to chase the animal each time treatment or inspection is needed. The enclosure should be kept dark, quiet and at a constant temperature suited to the animal's age and species.
2. **Standard Accommodation** - for the recovery period during rehabilitation. See Recommended Minimum Cage Sizes in the Appendix (note that larger enclosures than those specified may be necessary where an animal is regaining fitness or developing survival skills). This type of housing should be clean, quiet and provide appropriate shelter and security for the particular species (for instance, nest boxes, leafy branches, hollow logs or straw for burrowing).

Feeding

Clean, fresh food of the appropriate quality and quantity should be provided. This food should meet the animal's dietary and nutritional requirements, and be provided in a manner suitable for the species (for instance, fruit spiked on branches for possums, or worms scattered through leaf litter for Magpies). Fresh water should be provided and changed daily.

Good feeding management is essential for:

1. Rapid recovery and maximum healing potential.
2. Growth in young animals.
3. Maximum development of natural behaviour and survival techniques.

Captive diets should approximate the natural diet of the species to minimise the impact of captivity and to stimulate normal digestive function. Knowledge of the normal feeding habits of the species is necessary.

Handling

Most animals taken to shelters are frightened, physiologically stressed, mentally disoriented and may be sick, injured or in pain. Catching and handling injured wildlife should be done quickly and expertly to avoid further stress or injury.

Rough handling can easily injure small animals. The housing, feeding and cleaning of animals should be done gently and efficiently, with the least disturbance possible.

Care should be taken to minimise the risk of injury to handlers by animals attempting to defend themselves or escape. Appropriate protective clothing should be worn where necessary (eg some species should only be handled with gloves to prevent injury to the rehabilitator and cross infection).

It is vital that wild adult animals are not tamed during rehabilitation, as this reduces their chance of survival upon release. Although a tame animal may possess most other living skills, it behaves differently to a wild animal. It is often not accepted by members of its own species, and is more susceptible to predation. Animals are not suitable for release unless they display instinctual fear and avoidance towards humans and domestic pets.

Release procedures

Procedures for the release of an animal are most important and must be carefully planned. The long-term survival of the animal is dependent in part on the release being conducted efficiently and effectively.

An animal that has been in captivity for a short period of time (up to two weeks) will need little preparation for release. If it has had minimal handling and a suitable diet and enclosure during rehabilitation, the animal should be in reasonable condition and have maintained its normal wild behavioural responses. The shorter the period of time in captivity, the better an animal's chances will be for survival upon release.

An animal is ready to be considered for release when it:

1. Has no permanent physical impairment that may affect its chances of survival.
2. Has regained fitness and condition.
3. Is able to tolerate outside conditions and its natural food sources,
4. Displays normal behaviour. The animal must show instinctual fear of humans and predators, be able to catch and process food, interact with conspecifics, find or construct shelter, mark its territory if applicable, and move and navigate terrain with confidence.

The following steps should be undertaken prior to release:

1. The most appropriate method of release determined. For instance, if an animal has been held for a short time (eg. a week) it is likely to have retained its survival skills, and should not require any post release support to improve its survival chances. Therefore, the animal can be given a 'hard' release at the rescue site. Animals that have undergone an extended period in captivity may require a 'soft' release. This may involve the provision of food, shelter or predator protection over a protracted period.

2. All animals to be released must be inspected by a veterinarian or experienced wildlife rehabilitator to ensure they are free of overt disease (including any diseases contracted during captivity) which may be transmitted to native populations.

3. Wildlife should be transferred to the release site and handled in such a way as to minimise stress. They should be captured quickly and expertly, and placed in a receptacle suitable for the particular species involved (such as a box, bag or cage lined with cloth).

During transport, unnecessary noise should be avoided and the animal must have adequate ventilation. Only one animal should be transported per bag or box, other than mother and pouch young or a family group.

4. Avoid releasing an animal under circumstances that may cause additional stress, such as extremes of weather, or releasing during the wrong time of day (eg releasing nocturnal animals during daylight). Some animals fare better if released in established social groups. Animals that require nest boxes/hollows should not be released without at least a temporary nest box being provided to reduce stress and threat of predation immediately following release.

5. In the event where release is unsuccessful (for instance, the animal cannot find food, shelter or territory in the wild and is returned to the wildlife rehabilitator) the animal should be humanely euthanased. Exceptional circumstances should be discussed with an officer from DSE for example if the animal is a member of a threatened species.

Wildlife rehabilitator training and experience

Permit holders should possess appropriate skills to ensure the welfare of the wildlife temporarily in their care. These skills include:

1. A clear understanding of the objectives of wildlife rehabilitation.
2. Accurate identification of species.
3. First aid for injured wildlife.
4. Husbandry.
5. Avoidance of disease transmission.
6. A basic understanding of wildlife ecology and population dynamics.
7. The ability to access specialised information.
8. Handling techniques.

In order to obtain and maintain an appropriate level of technical skills, a certain degree of training is necessary. Attendance at training sessions on a regular basis and a demonstrated undertaking to meet the standards embodied in this Code will facilitate permit renewal.

To ensure the welfare of wildlife in their care, wildlife rehabilitators should only take as many animals as they can manage.

To assist with the care of sick injured or orphaned wildlife and to provide a training facility for potential wildlife rehabilitators, up to three foster carers may be nominated under each permit to provide assistance. The wildlife rehabilitator will be responsible for the actions of the foster carers listed on the permit and is required to oversee the rehabilitation process. The permit holder cares for animals that are difficult to look after, while foster carers requiring experience are usually restricted to animals that are easy to rehabilitate.

Records

An important aspect of wildlife rehabilitation is the compilation and maintenance of accurate records relating to animal admissions. Such records assist in the treatment, rehabilitation and release of animals, provide valuable case history information for future admissions, and are an important resource for other wildlife rehabilitators.

Statistics from these records can also be used to analyse the factors involved in wildlife rehabilitation, such as the reasons why animals are brought to shelters, the species involved, the areas they are coming from, and the outcomes of rehabilitation. In addition, these records are required by DSE for inspections.

Wildlife rehabilitators should note that it is a condition of the permit that records be maintained in an appropriate format.

The permit specifies the type of information that should be recorded. Wildlife rehabilitators are also encouraged to keep their own additional details regarding the care, treatment and release of animals.

Essential information to be recorded includes:

1. the species
2. the date the animal was brought into the shelter
3. where the animal was found
4. the animal's injuries / condition
5. the cause of the animal's injury / condition (if known)
6. the fate of the animal (including release site and release date if applicable).

REFERENCES

These notes have been put together with reference to information from Dr Mike Cannon, Dr Helen McCracken and Dr Robert Johnston as well as the books below.

General Care books.

Care of Australian Reptiles in Captivity, John Weigel, Reptile Keepers Assoc, 1988

Husbandry and Disease of captive Reptiles H McCracken

Identification books:

Key guide: Australian Reptiles and Amphibians L Cronin Envirobook 2001

A complete Guide to the Reptiles of Australia S Wilson, G Swan 2003

Reptiles and Amphibians of Australia Cogger Reed Books

University of NSW series:

Pythons G Torr 2000

Goannas D King & B Green 1999

Australian Reptile Keepers Guides:

Bearded dragons D Green & T Larson 1999

Blue tongue lizards G Turner 2001

Long neck turtles D Green 2000

Short neck turtles D green 2000

Websites to visit:

www.kingsnake.com/australia

www.herpsshop.com.au – online shop for herpetology items

www.reptilesdownunder.com

www.fauna.org.au – for carer conference proceedings on wildlife care

www.backyardbuddies.net.au

www.dsi.vic.gov.au – for information on code of practice on keeping reptiles and wildlife.

www.ultimatereptiles.com.au

www.jcu.edu.au/school/phtm/PHTM/frogs/ampdis

www.wildcare.org.au

www.fdrproject.org

www.vhs.com.au Victorian herpetological society

DATE _____ **SPECIES** _____
LOCATION FOUND

Name of person who found animal _____
contact number _____

WEIGHT _____

NATURE OF INJURY- how was animal found?

PHYSICAL EXAMINATION

Body part	Normal	Abnormality found
eyes		
ears		
Mouth – tongue, lips		
Beak / teeth		
nose		
Skin on head		
Forearms/wings		
Hind legs		
abdomen		
chest		
Skin/feathers/scales		
Anus/cloaca		
Breathing		
Faeces/urine		
Skin on body		

SUMMARY OF TESTS DONE BY THE VET

RADIOGRAPH

OTHER _____

TREATMENT

Outcome _____

MEALWORMS (*Tenebrio sp*)

Mealworms are the larvae of the flour beetle.

There are four stages in the life cycle.

1. **Egg:** these are white, bean-shaped and 1.2mm long.
2. **Larvae** are white to yellow in colour. They are small to start and grow up to 32mm long. An increase in size is associated with good food.
3. **Pupae** are soft and white, becoming yellow as they mature.
4. **Adult** is a dark brown beetle. It has more chitin and less nutrition than the larvae or pupae stage.

Mealworms are a useful additive to a diet but should not be fed as the sole source of nutrition. They can be obtained from pet stores or direct from Pisces International.

Refrigeration of mealworms is associated with an increased number of dead worms over time.

Housing mealworms

Enclosure: use a plastic or glass fish tank. It should be covered using a lid or fly screen/shade cloth. Good ventilation is important and prevents the growth of fungi. This can be toxic to the larvae.

Substrate should be about 20 cm deep. A number of substrates can be used: chicken crumble, wheatgerm, pollard, or crushed Hills feline maintenance dry food. A combination of ingredients can be used. Other ideas include polenta, bread crumbs or borghul.

Calcium powder can be added to the substrate in small amounts.

Supplements such as the Wombaroo or Passwell products (small carnivore, insectivore, reptile or finch/parrot) could also be added.

Overcrowding is associated with cannibalism.

Feeding mealworms

Mealworms do eat the substrate.

However, other foods should be fed to them to increase their value as food.

Items suitable for feeding include: potato, apple, sweet potato, pumpkin. Green foods to offer include dark green vegetables e.g.: sliced broccoli, outer leaves of dark lettuces, Chinese vegetables, etc.

Do not overfeed – the food should be eaten before adding new food.

Do not throw out the old bits of food as the eggs are laid in them.

Cleaning the enclosure

At the bottom of the enclosure you will see fine powdery grey excreta. When this builds up, it is time to clean the enclosure. This can be done by sifting. Do not throw out the excreta as it will contain the eggs of the worms. You can continue to feed this and feed off the worms that you find in the mix. If you do throw it out, it makes an excellent addition to the compost bin!

Biology

The beetles live for 2 – 3 months.

The female beetle lays 275 or more eggs.

The eggs take two weeks to hatch.

The larvae complete their growth in 6 months or less.

The optimal temperature to keep mealworms is 26°C.

Lower temperatures (18°C) result in slower growth, higher temperatures (37°C) result in quicker growth.

Larvae moult between 9 – 20 times before they pupate.