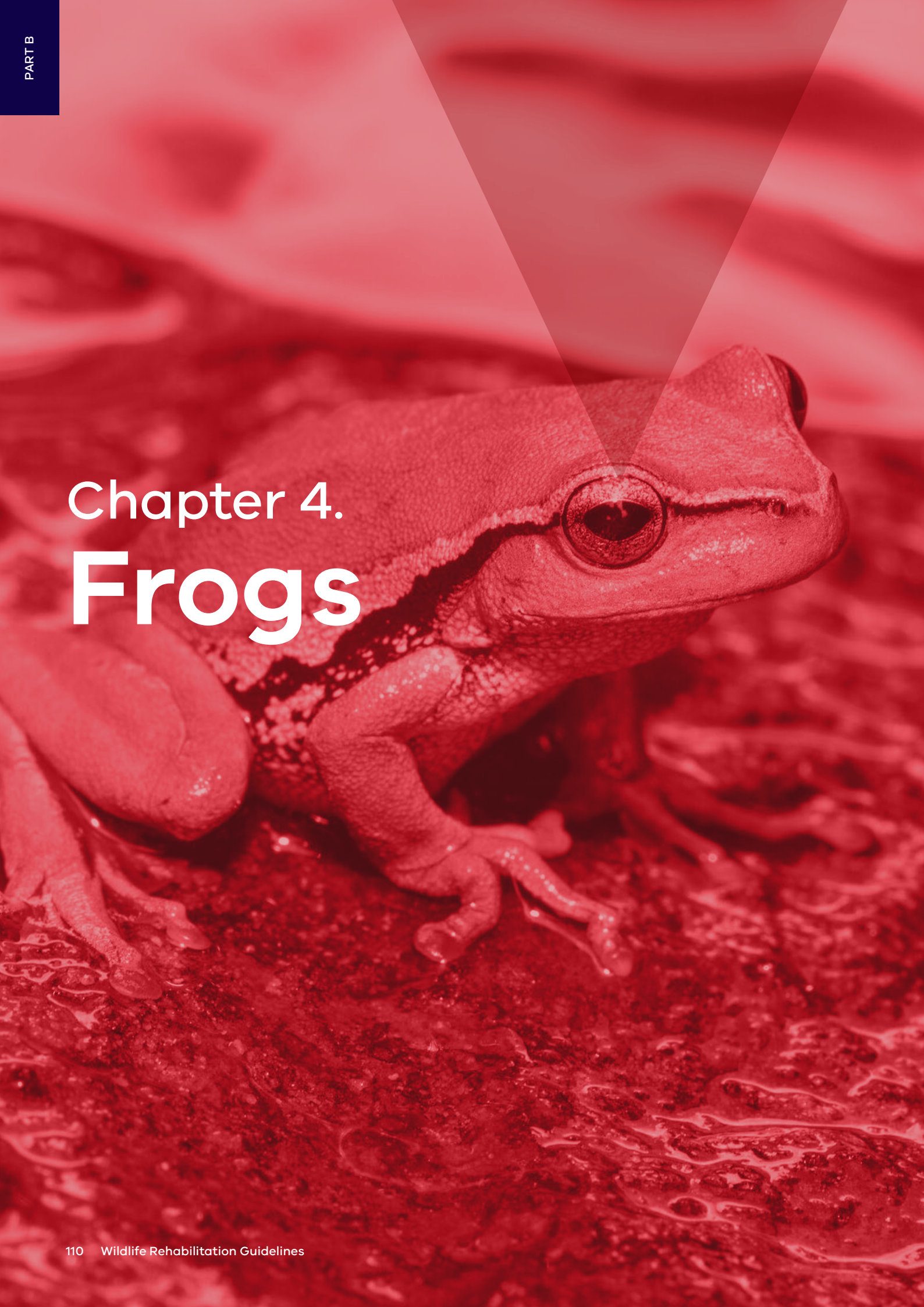


# Chapter 4.
# Frogs

# Contents

Photo credit: David Paul, Museums Victoria

In Victoria, sick, injured or orphaned wildlife can only be rehabilitated by a wildlife shelter operator or foster carer who is authorised under section 28A of the Victorian *Wildlife Act 1975* (Wildlife Act). Wildlife rehabilitators are subject to strict conditions. The mandatory requirements that they must meet are set out in the Wildlife Shelter and Foster Carer Authorisation issued under the Wildlife Act. These conditions enforce the minimum standards required for the humane treatment and successful rehabilitation of wildlife in care. The Wildlife Rehabilitator Authorisation Guide: Things You Need To Know explains how wildlife rehabilitators can meet these mandatory requirements and can be found here: **https://www.vic.gov.au/wildlife-rehabilitation-shelters-and-foster-carers**.

The Victorian Wildlife Rehabilitation Guidelines have been developed to incorporate evidenced-based best practice in wildlife care and rehabilitation to equip rehabilitators to deliver positive welfare outcomes for individual animals in their care from first aid to post-release into the wild.

**You must comply with the conditions of your authorisation. These guidelines must be read in conjunction with the conditions of your authorisation.**

## 4.1 Introduction

Several frog species are listed as threatened in Victoria. To determine if a frog species is threatened, consult the *Flora and Fauna Guarantee Act 1988* Threatened List (**Flora and Fauna Guarantee Act Threatened List (environment.vic.gov.au)**.

STOP

***STOP – If a threatened species come into care, please STOP and refer to your authorisation for mandatory conditions including notification and release requirements.***

Rehabilitation of frogs requires careful consideration given the high risk of transmitting infectious diseases to wild populations (for example chytrid fungus). All rehabilitated frogs must be returned to the location where they were found. If this location is a national park, then DEECA should be contacted pre-release.

STOP

***STOP – If there is any suspicion that an animal may have chytrid fungus (see Section 4.5.3 to assist with this determination), it should be euthanised immediately. Never release unhealthy frogs back into the wild. Chytrid fungus has caused extinctions of Australian frogs in the wild. Do not spread it further.***

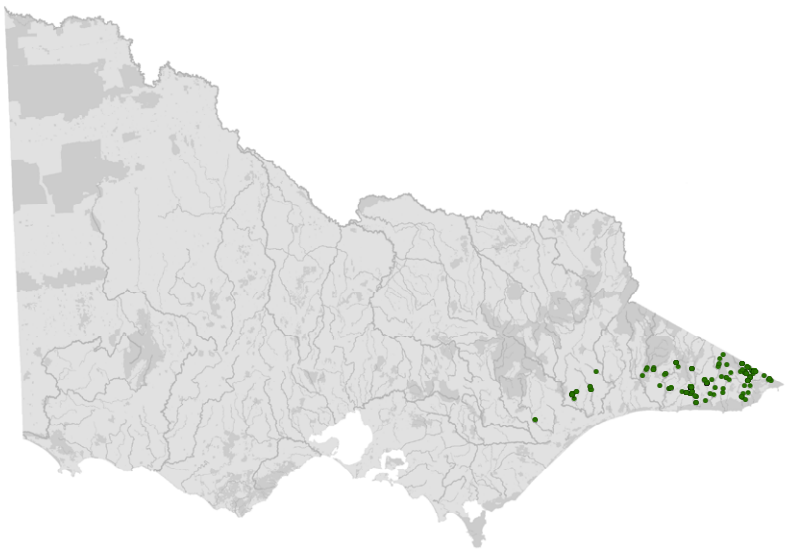
When frogs come into care it is the responsibility of the wildlife rehabilitator to ensure that the five domains of animal welfare are satisfied. These include providing optimal nutrition and an environment appropriate to the stage of rehabilitation. The focus should be on the frog's return to health and release, which is facilitated through regular collaboration with a veterinarian. It is also important to consider the animal's mental state and ability to exhibit normal behaviours without detrimentally affecting its recovery. Welfare may be temporarily compromised by the necessity of a gradual return to normal activity, depending on its stage of rehabilitation. Further information about the five domains of animal welfare can be found in Part A of these guidelines.

# 4.2 Species information

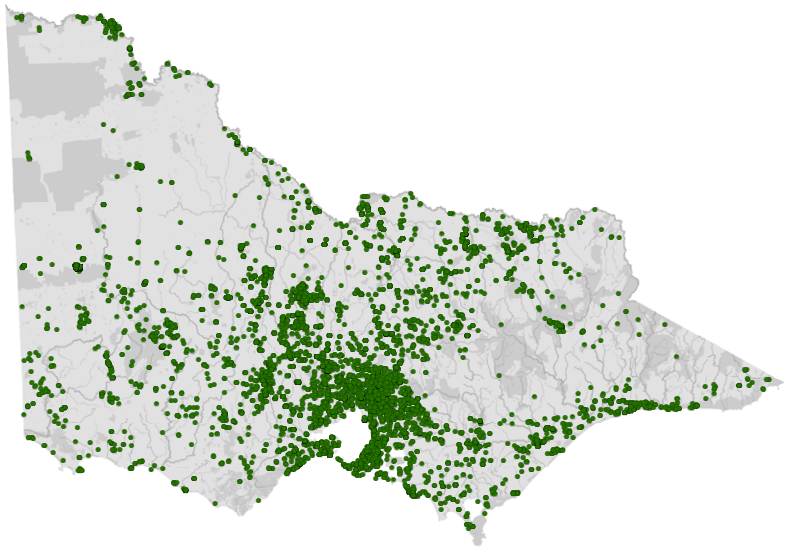
Profiles for some of the frog species found in Victoria are detailed in the tables below. It does not describe the entire 36 frog species found in Victoria. Many of these species may have more than one common name. Variation in colour occurs frequently.

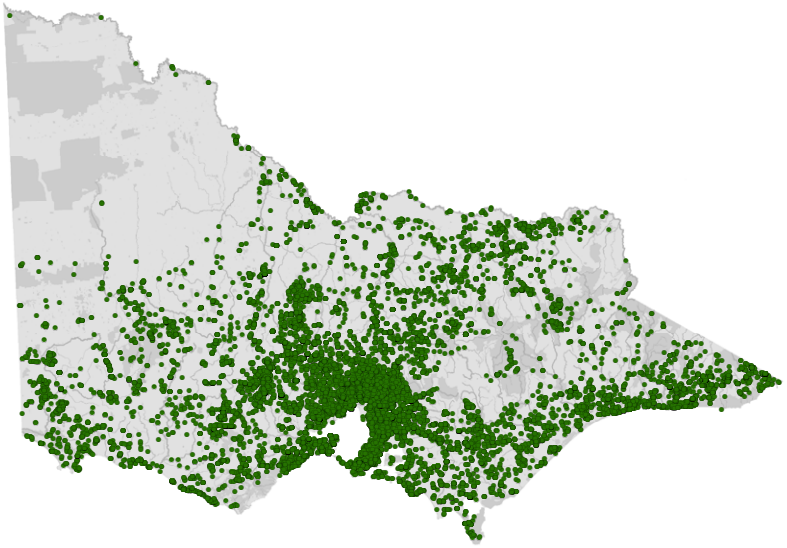
Frogs may be presented for identification by concerned members of the public. Some frogs, such as banjo frogs, are presented as suspected cane toads. It is preferable to leave the frog where it is and ask to see an image instead. If the frog has no injuries, it should be returned to the location where it was found as soon as possible. For assistance in identification of frog species refer to the recommended reading and reference material at the end of this chapter.

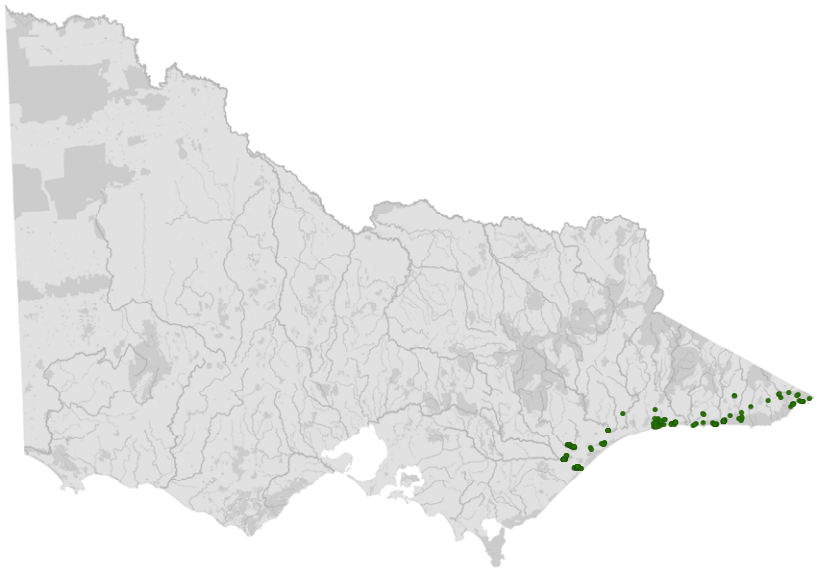
**Table 4.1** Species Profiles

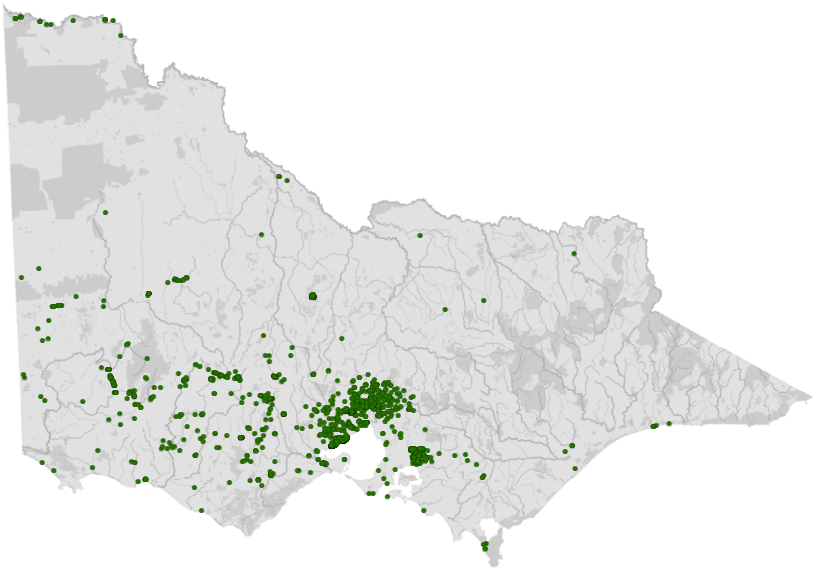
| Species | Blue mountains tree frog (*Litoria citropa*) |
|---|---|
|  Photo credit: David Paul, Museums Victoria | Distribution map  Data source: Victorian Biodiversity Atlas Jan 2023 www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas |
| **General appearance** | Brown back. Green on side of head and flanks |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 60–90 mm |
| **Habitat** | Terrestrial<br>Heaths, wet and dry forest<br>Hides under rocks near water |

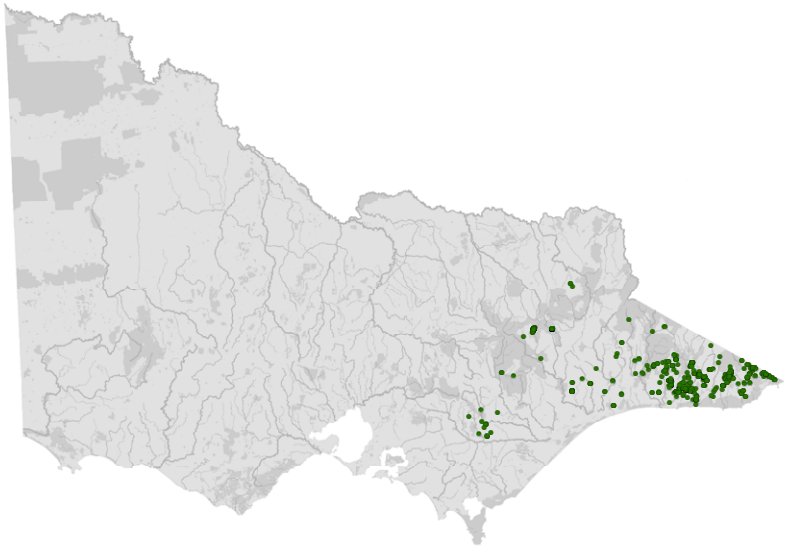
| Species | Blue mountains tree frog (*Litoria citropa*) |
|---|---|
| Natural activity peak | Nocturnal |
| Diet | Insects |
| Breeding season | Late winter to early summer |
| Tadpole development | 2–4 months |

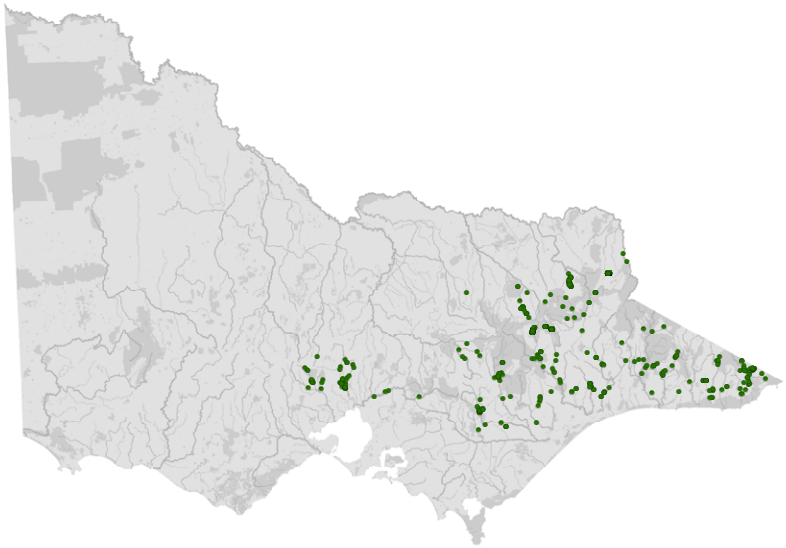
| Species | Eastern banjo frog (Pobblebonk) (*Limnodynastes dumerilii*) |
|---|---|
|  <br>Photo credit: Ian R McCann, Museums Victoria | **Distribution map**<br>  <br>Data source: Victorian Biodiversity Atlas Jan 2023<br>**www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| General appearance | Grey or brown above. Pale strip below eye to front leg |
| Conservation status* | Not listed |
| Adult morphometrics | 60–90 mm |
| Habitat | Permanent water: stream, dam, swamp |
| Natural activity peak | Nocturnal |
| Diet | Insects |
| Breeding season | Spring–autumn |
| Tadpole development | 4–5 months |

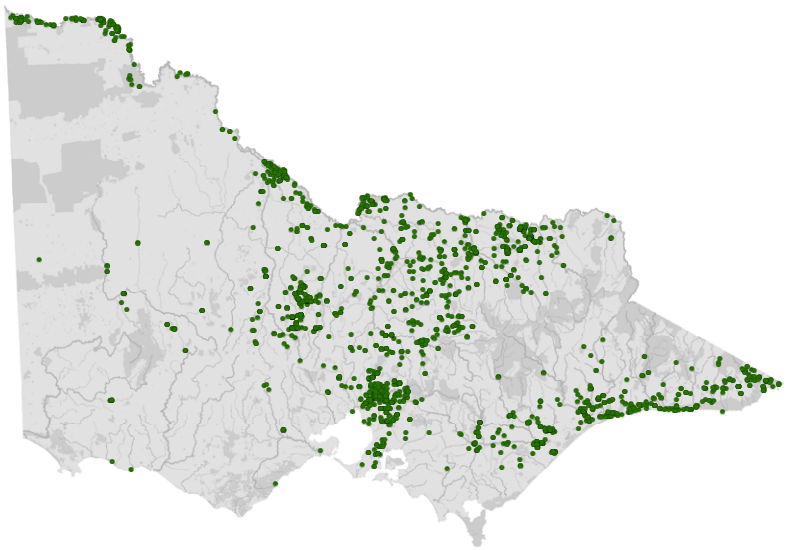
| Species | Eastern common froglet (*Crinia signifera*) |
|---|---|
|  Photo credit: Nick Clemann, DEECA | Distribution map  Data source: Victorian Biodiversity Atlas Jan 2023 **www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| **General appearance** | Variable colour: grey to brown. Dark band from eye to groin |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 18–30 mm |
| **Habitat** | Widely varied habitat: coast to inland. Hides under logs and rocks |
| **Natural activity peak** | Diurnal |
| **Diet** | Insects |
| **Breeding season** | Year round |
| **Tadpole development** | 2.5–3 months |

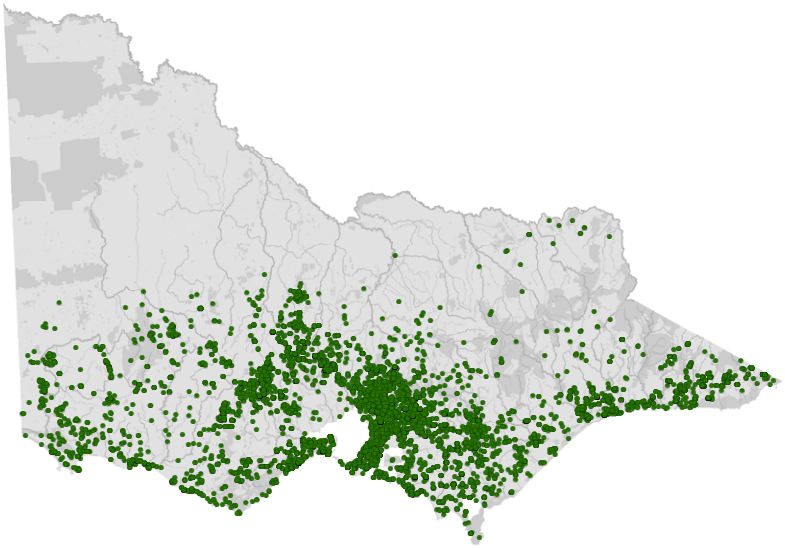
| Species | Green and golden bell frog (*Litoria aurea*) |
|---|---|
|  <br>Photo credit: David Paul, Museums Victoria | **Distribution map**<br>  <br>Data source: Victorian Biodiversity Atlas Jan 2023<br>www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas |
| **General appearance** | Green and gold spots on back, smooth back. Yellow strip from head to groin. Groin is blue. Male and female shown |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 55–100 mm |
| **Habitat** | Aquatic<br>Near permanent water |
| **Natural activity peak** | Diurnal |
| **Diet** | Insects, earthworms, slugs, freshwater crayfish |
| **Breeding season** | Spring–summer |
| **Tadpole development** | 3–11 months |

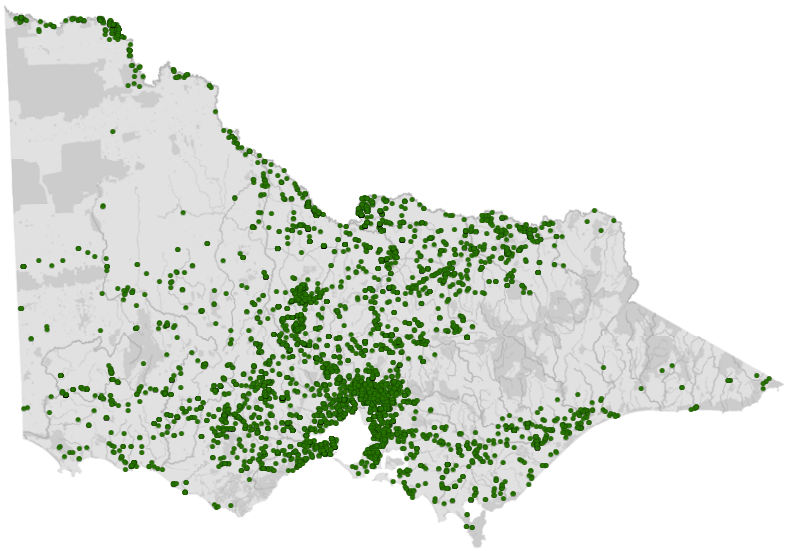
| Species | Growling grass frog (*Litoria raniformis*) |
|---|---|
|  Photo credit: Nick Clemann, DEECA | **Distribution map**  Data source: Victorian Biodiversity Atlas Jan 2023 **www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| **General appearance** | Back is green and brown with large warts |
| **Conservation status*** | Vulnerable |
| **Sexual dimorphism** | Male: 55–65 mm<br>Female: 60–100 mm |
| **Adult morphometrics** | 55–100 mm |
| **Habitat** | Aquatic, close to or in water or very wet areas in woodlands, shrublands and open and disturbed areas |
| **Natural activity peak** | Diurnal and nocturnal |
| **Diet** | Invertebrates, frogs, lizards, small fish |
| **Sexual maturity** | Male: 43 days<br>Female: 113 days |
| **Breeding season** | Spring–summer |
| **Tadpole development** | 3–12 months |

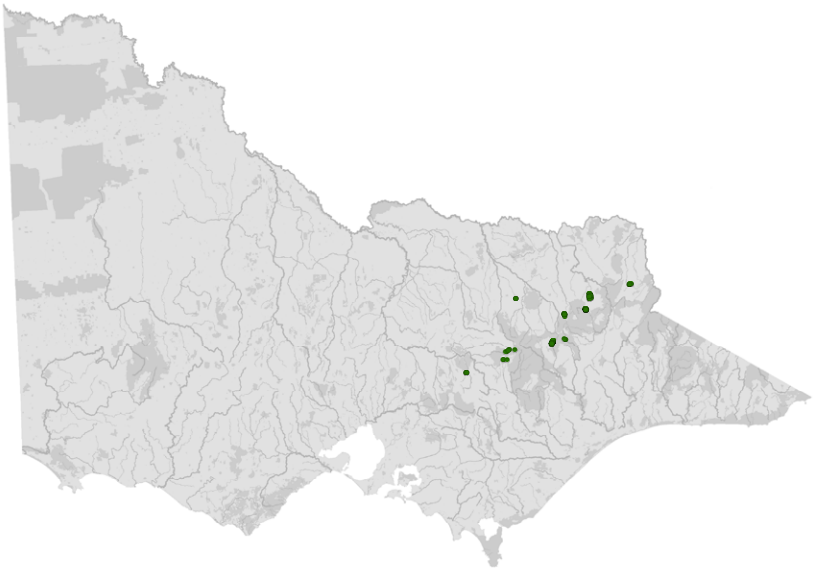
| Species | Leaf green tree frog (*Litoria nudidigitus*) |
|---|---|
|  Photo credit: David Paul, Museums Victoria | **Distribution map**  Data source: Victorian Biodiversity Atlas Jan 2023 **www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| **General appearance** | Bright green above, often with scattered white spots on the sides and occasionally on the back. Ventral surface white |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 25–40 mm |
| **Habitat** | Aquatic, rocky rivers and streams in rainforest and wet forest |
| **Natural activity peak** | Nocturnal |
| **Diet** | Small invertebrates |
| **Breeding season** | Spring–summer |
| **Tadpole development** | >2 months |

| Species | Lesueur's frog (*Litoria lesueuri*) |
|---|---|
|  Photo credit: Nick Clemann, DEECA | **Distribution map**  Data source: Victorian Biodiversity Atlas Jan 2023 **www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| **General appearance** | Back is yellow to brown, Black stripe from nose to shoulder. Back of thigh is black |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 30–60 mm |
| **Habitat** | Terrestrial<br>Can be away from water<br>Dry forest, heath, rainforest, often found long distances from water |
| **Natural activity peak** | Nocturnal |
| **Diet** | Small invertebrates |
| **Breeding season** | Spring–summer |
| **Tadpole development** | >2 months |

| Species | Peron's tree frog (*Litoria peronii*) |
|---|---|
|  <br>Photo credit: Rodney Start, Museums Victoria | Distribution map<br>  <br>Data source: Victorian Biodiversity Atlas Jan 2023<br>www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas |
| **General appearance** | Grey or brown above with irregular darker mottling and small, bright green emerald spots. Ventral surface cream or yellow with scattered dark brown flecking on throat. Cross-shaped appearance to iris |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 45–70 mm |
| **Habitat** | Terrestrial<br>Pools, dams, ditches in forested habitats and grassland |
| **Natural activity peak** | Nocturnal |
| **Diet** | Insects |
| **Breeding season** | Spring to summer after rain |
| **Tadpole development** | 3–4 months |

| Species | Southern brown tree frog (*Litoria ewingii*) |
|---|---|
|  <br>Photo credit: David Paul, Museums Victoria | **Distribution map**<br>  <br>Data source: Victorian Biodiversity Atlas Jan 2023<br>**www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| **General appearance** | Pale to cream-brown back, yellowish-white, cream or white belly. Yellow to red-orange backs of thighs and groin |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 30–60 mm |
| **Habitat** | Terrestrial<br>Preference for flooded grasslands or marshes but found in all habitat types<br>Common in gardens |
| **Natural activity peak** | Nocturnal |
| **Diet** | Insects |
| **Breeding season** | Year round |
| **Tadpole development** | 6–7 months |

| Species | Spotted marsh frog (*Limnodynastes tasmaniensis*) |
|---|---|
|  <br>Photo credit: Ian R McCann, Museums Victoria | Distribution map<br>  <br>Data source: Victorian Biodiversity Atlas Jan 2023<br>www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas |
| **General appearance** | Large olive-green blotches on the back, and sometimes a yellow, red or orange mid-dorsal stripe |
| **Conservation status*** | Not listed |
| **Adult morphometrics** | 30–60 mm |
| **Habitat** | Terrestrial<br>Wet coastal to dry interior. Hides under logs |
| **Natural activity peak** | Nocturnal |
| **Diet** | Insects and spiders |
| **Breeding season** | Spring–autumn |
| **Tadpole development** | >3.5 months |

| Species | Spotted tree frog (*Litoria spenceri*) |
|---|---|
|  Photo credit: D Goodall, Zoos Victoria | **Distribution map**  Data source: Victorian Biodiversity Atlas Jan 2023 **www.environment.vic.gov.au/biodiversity/victorian-biodiversity-atlas** |
| **General appearance** | Back is brown and green. Groin is orange |
| **Conservation status*** | Critically endangered |
| **Adult morphometrics** | 42–70 mm |
| **Habitat** | Semi-aquatic, among boulders or debris in or beside fast flowing mountain streams |
| **Natural activity peak** | Diurnal and nocturnal |
| **Diet** | Insects |
| **Breeding season** | Spring–summer |
| **Tadpole development** | 3 months |

*From the *Flora and Fauna Guarantee Act 1988* Threatened List June 2023. This list is updated regularly throughout the year. For the most current list, please visit **https://www.environment.vic.gov.au/conserving-threatened-species/threatened-list**.

### Exotic and non-endemic native species (contact your local DEECA authorised officer)

Non-endemic native species, such as those listed below, are Australian species that are not found in Victoria and come into care in this state. They may be pet frogs that escape their enclosures or stowaways that arrive in containers or boxes with shipped goods. For example frogs from other states often arrive in fruit and vegetable boxes. These frogs may not be injured but may be dehydrated and sick. They may have been sprayed with pesticides or frozen/refrigerated.

Non-endemic native species **must not** be released into the wild in Victoria as survival chances are low and they may spread disease. An authorised officer of DEECA should be contacted to determine the best course of action for the animal.

In cases where the frog is suspected to be an escaped pet, take the animal to a veterinarian to be scanned for a microchip. If an owner can be identified, the animal should be returned as soon as possible.

Occasionally exotic frog species come into care. An example of this is the cane toad (*Bufo marinus*) – an olive-brown, warty toad found in New South Wales, the Northern Territory and Queensland. Exotic frogs also occasionally enter Australia and Victoria as stowaways from overseas in shipping containers and with international travellers. An example of this is the Asian black-spined toad (*Duttaphrynus melanostictus*) which has been known to hide in the shoes of travellers returning from south-east Asia. Exotic species must be euthanised as they are a pest and pose a threat to many native species. It is illegal to be in possession of such species. Notify Agriculture Victoria of stray, captured or surrendered exotic animals on 136 186 or email **highrisk.invasiveanimals@agriculture.vic.gov.au**.

**Table 4.2** Some non-endemic frog species that may be found in Victoria

| **Species** | **Dainty green tree frog (*Litoria gracilenta*)** |
|---|---|
| **General appearance**<br>  <br>Photo credit: Zoos Victoria | Green back, yellow abdomen |
| **Distribution map** | Far north Qld to Sydney, NSW |
| **Adult morphometrics** | Up to 45 mm |
| **Habitat** | Dense vegetation and reeds associated with water. Ditches, marshes, lagoons and stream banks |
| **Breeding season** | Spring to summer after heavy rain |
| **Tadpole development** | >2 months |

| Species | Eastern dwarf tree frog (*Litoria fallax*) |
|---|---|
| General appearance  Photo credit: Zoos Victoria | Small, green back, orange legs |
| Distribution map | Far north Qld to Sydney, NSW |
| Distribution map | Qld, NSW |
| Adult morphometrics | Up to 25 mm |
| Habitat | Swamps, lagoons, ditches, ponds and dams. Found in reeds, bromeliads and banana trees |
| Breeding season | Year round |
| Tadpole development | 2.5–4.5 months |

| Species | Green tree frog (*Litoria caerulea*) |
|---|---|
| General appearance  Photo credit: Jonny Pickvance | Large, green, fold around ear |
| Distribution map | WA, NT, Qld, NSW |
| Adult morphometrics | Up to 110 mm |
| Habitat | Swamps, flooded ditches, ponds, tree hollows and human associated water bodies |
| Breeding season | Spring–summer |
| Tadpole development | >1 month |

| Species | Red-eyed green tree frog (*Litoria chloris*) |
|---|---|
| General appearance<br>  <br>Photo credit: ©The State of Queensland | Orange eye, green back, yellow abdomen |
| Distribution map | Qld to Sydney, NSW |
| Adult morphometrics | Up to 65 mm |
| Habitat | Flooded grasslands, streams and ponds |
| Breeding season | Spring to summer after heavy rain |
| Tadpole development | >2 months |

| Species | White-lipped green tree frog (*Litoria infrafrenata*) |
|---|---|
| General appearance<br>  <br>Photo credit: Zoos Victoria | Green back, white abdomen, white stripe around lower jaw |
| Distribution map | Far north Qld |
| Adult morphometrics | Up to 135 mm |
| Habitat | Pools, swamps and garden ponds |
| Breeding season | Late spring to summer |
| Tadpole development | 1–2.5 months |

# 4.3 Animal and human safety considerations

In general, animals in the wild have limited contact with people, pets, and the hustle and bustle of our daily lives. When sick, injured or orphaned wild animals come into care this unnaturally close contact can carry risks to the health and safety of both people and animals. For general information on biosecurity and approaches to minimise these risks see Part A of these guidelines. Specific information on enclosure hygiene and biosecurity for frogs is in **Section 4.6.2**.

The following information relates to the human and animal health and safety considerations specifically related to the rehabilitation of frogs.

## 4.3.1. Human safety considerations

- Native frogs do not secrete harmful substances in their skin, unlike the cane toad.
- Wash hands with soap and water after handling frogs to minimise the risk of infection with zoonotic disease agents such as *Salmonella*.

## 4.3.2. Animal safety considerations

- Frogs may be preyed upon by domestic pets. Restrain any pets before capture is attempted. The capture may involve the use of a net or hands to catch the frog. These frogs may be injured.
- Rough handling of frogs can damage their skin or break limbs.
- Be aware that frogs can make unpredictable movements and may leap out of your hands and escape.
- Chemicals and other substances on human skin can harm the frog. Important: Detergents must be avoided if the enclosure is housing frogs due to their semi-porous skin and sensitivity to toxins. Hot dechlorinated water and scrubbing will suffice.
- Chytrid fungus has been implicated in the decline and extinction of several frog species in Australia. It is transferred by exposure to infected water and direct contact between frogs and tadpoles. The disease kills frogs and quickly spreads through populations of frogs in streams and ponds. See **Table 4.5** and **Section 4.6.2** for more information.

# 4.4 Capture, restraint, and transport

STOP

*STOP – A visual examination must be done BEFORE the animal is captured. This applies to the initial capture from the wild as well as prior to captures which occur during time in captive care. See* Section 4.4.1 *for information on what to look for when conducting a visual health assessment.*

Refer to Part A of these guidelines for general advice on wildlife welfare, biosecurity and hygiene, and record requirements. The following information relates to the capture, restraint, and transport of sick, injured and orphaned frog species.

## 4.4.1. Visual observations

Visual observations of wildlife should be conducted prior to any attempts to capture the animal. This is just as important prior to the first capture from the wild as it is before any capture conducted while an animal is in captive care. Observations should be conducted quietly, by one person, and from a distance which provides a clear view of the animal with as little disturbance as possible. Visual observation should focus on the animal's demeanour, behaviour, movement and posture. Check for evidence of injury/severe disease or deterioration and assess their breathing as demonstrated in the following table.

**Table 4.3** Visual health observations in frogs

| | What to look for |
|---|---|
| **Demeanour** | • Bright, alert with eyes open<br>• Reactive to being approached, may try to avoid capture |
| **Behaviour** | • Sits quietly<br>• Suddenly hops – be mindful of this to prevent injury to the frog |
| **Movement and posture** | • Sits up with all four legs tucked against the body<br>• Able to use all four legs without dragging any of them<br>• Alignment of spine appears straight/normal |
| **Breathing** | • Regular with no obvious effort<br>• Nostrils are clear and open, free from discharge |

### 4.4.2. Equipment

- **Gloves:** Nitrile or latex gloves free from powder should be used when handling frogs. If more than one frog is to be handled the 'one glove, one frog' approach must be taken. Note: Gloves should not be used for handling tadpoles. Latex and nitrile gloves are toxic for tadpoles.
- **Net:** Frogs are easily captured using small aquarium fish nets. Do not use a fish net that has been used in a domestic aquarium. Fish nets need to be sterilised in 1 per cent bleach solution for one minute or a 1:250 solution of F10 SC for a minimum of 1 minute and thoroughly rinsed between different sites.
- **Transport container:** Frogs can be transported in cheap and disposable plastic containers, such as takeaway food containers or small plastic carry cages with holes for ventilation.

**Figure 4.1 A plastic tub with holes for ventilation makes a simple transport container for frogs.**

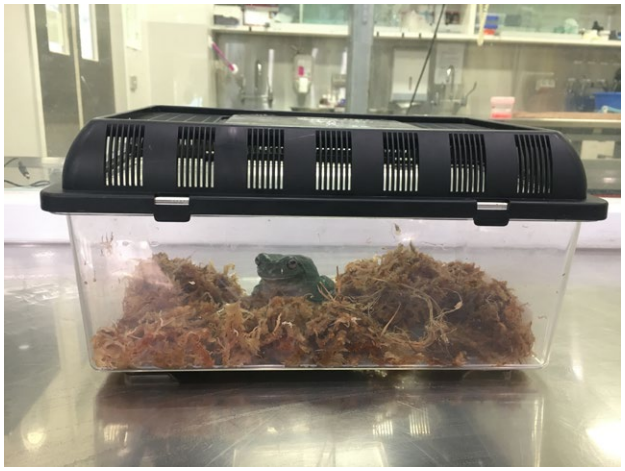


Image: Zoos Victoria

### 4.4.3. Technique

**It is beyond the scope of these guidelines to outline techniques for every situation that may be encountered. Examples of techniques for some specific situations are outlined in the following section.**

**In addition to this information, for further advice please also refer to the recommended reading list, zoological institutions, veterinarians and/or wildlife experts. Inexperienced rescuers should request assistance where possible.**

**Given the risks associated with the transfer or spread of chytrid fungus, hygiene and quarantine protocols are critical when handling and caring for frogs.**

- Use gloves rather than bare hands. This also protects the frog's sensitive skin from residue on your hands.
- The gloves should be moistened with water from the enclosure or waterway before picking up the frog.
- Restrain the frog by cupping one hand around it and supporting the abdomen with the other hand (see **Figure 4.2**).
- A hand may be held in front of the frog, blocking its line of sight to reduce the likelihood of it jumping forward.
- Tadpoles can be scooped up in a net or jar.

**Figure 4.2** Restraint of a white-lipped green tree frog in the hand. Note the gloves are wet.

Photo credit: Zoos Victoria

### 4.4.4. Transport

- Minimise travel time.
- Ensure that the enclosure has adequate ventilation and is not exposed to direct sunlight during travel.
- If travel in hot conditions is unavoidable, the vehicle must have adjustable climate control facilities that ensure the area containing the frog is maintained at a temperature of 25°C or less for the duration of transport.
- A small amount of water from the waterway in which the frog was found may be placed in the container, but it is preferable to use damp tissue or paper towel.
- Do not place rocks or pebbles in the transport container, as these may cause crush injuries.
- Cover the transport container to prevent the frog from injuring itself by jumping against the sides.

# 4.5 Monitoring animal health and welfare

The goal of wildlife rehabilitation is to address health and welfare concerns quickly and effectively so wildlife can be released back to the wild as soon as possible. Decision-making from the time of capture through to release should be guided by an accurate understanding of the animal's true state of health and welfare. Careful monitoring throughout the rehabilitation period ensures that significant issues, or deterioration in health condition, are identified immediately and rapidly addressed.

It is preferred that all sick, injured or orphaned wildlife be assessed by a veterinarian to ensure that non-obvious signs of trauma or disease can be assessed and treated as soon as practicable. No medication should be provided prior to this assessment, as this can mask clinical signs and make an accurate health assessment by the veterinarian very difficult.

Templates for record-keeping visual and physical observations and daily care can be found in Part A of these guidelines.

This section provides guidance on health assessments on arrival and on effective monitoring of the health and welfare of individuals in care through minimising human-animal interactions and stress to the animal to maximise successful release back to the wild.

## 4.5.1. Physical examination

Once visual observations are complete, and the animal is stable enough to withstand capture and handling, a basic physical examination should be conducted. This can be repeated when required any time the carer has the animal in the hand, such as for an enclosure change. However, if a full physical exam is not conducted, body condition and weight should be assessed every time the animal is in the hand for other reasons. Carers should make sure weighing scales are available and ready to use before capturing the animal. Physical examinations are also required if the carer notices any changes suggestive of deteriorating health or an injury.

Always record the physical examination findings so that you can compare findings as the animal's rehabilitation progresses. This ensures any health concerns are identified as soon as possible, and the carer can plan release as soon as this is appropriate. **A template for recording physical examination findings can be found in the appendices to Part A of these guidelines.**

Examinations should be conducted in a quiet location, away from domestic animals. Only one person should handle the animal, while a second person takes notes. All other people should move away, and noise kept to a minimum. Handling should also be kept to a minimum, with careful monitoring for any signs of distress (such as sudden deterioration in demeanour or limp posture). If these are seen, the examination should be stopped immediately, and the animal returned to its catch bag, transport box or enclosure and allowed to recover.

**Species specific considerations:**

- Frogs can be examined while conscious, under manual restraint. However, for painful conditions or deep injuries examination under anaesthesia is required.
- The frog can be held in one hand and limbs gently extended with the other, looking for obvious abnormalities.
- Be careful that the frog does not leap out of the hand as it can fracture a leg if it lands on the ground.
- A tongue depressor, guitar pick or credit card can be used to open the mouth. Be gentle to avoid damaging the mouth.
- **Table 4.4** provides additional guidance on what to look for during physical examinations.

**Table 4.4** Physical examination

| | What to look for |
|---|---|
| **Body weight** | • Record body weight on arrival and weekly while in care.<br>• A greater than 10% change in body weight is cause for concern, and the carer should seek veterinary advice immediately.<br>• It is important to know species specific normal size and weights, some small species may not tolerate weight fluctuations. |
| **Body condition** | • Body condition is scored by evaluating muscle coverage over the spine and hips. See **Figure 4.3**. Body condition can be described as follows:<br>- **Under condition:** The pelvis and spine are prominent.<br>- **Ideal condition:** Top of the pelvis can just be seen.<br>- **Over condition:** Unable to see the spine or outline of the pelvis. |
| **Hydration status** | • Frog skin should be moist.<br>• A dehydrated frog has dry, tacky skin that may be darker than normal, appears wrinkled and shrivelled and feels leathery to the touch. |
| **Eyes** | • Open, surface is clear with no opacities.<br>• Eyes should both be open, shiny and clear, with no bubbles or discharge<br>• Basic internal structures of eyes (e.g. pupil, iris) appear symmetrical. |
| **Mouth** | • Symmetrical, no blood visible, light pink inside.<br>• Jaw/mouth aligned normally, no evidence of displacement or fracture. |
| **Skin** | • Smooth, moist, no tears or masses.<br>• Pigmentation should be consistent with the species. |
| **Limbs** | • Hind legs tucked in when sitting.<br>• No limbs hanging abnormally. |
| **Sex determination** | • Females tend to be larger.<br>• Males call during the breeding season and may have nuptial pads on their fore fingers. |

**Figure 4.3** Body condition scoring in frogs. a. A thin Peron's tree frog. The spine and pelvic bones are visible. b. A white-lipped green tree frog in ideal condition. The top of the pelvis can just be seen. c. An overweight spotted marsh frog. Note that it is difficult to see the pelvis.

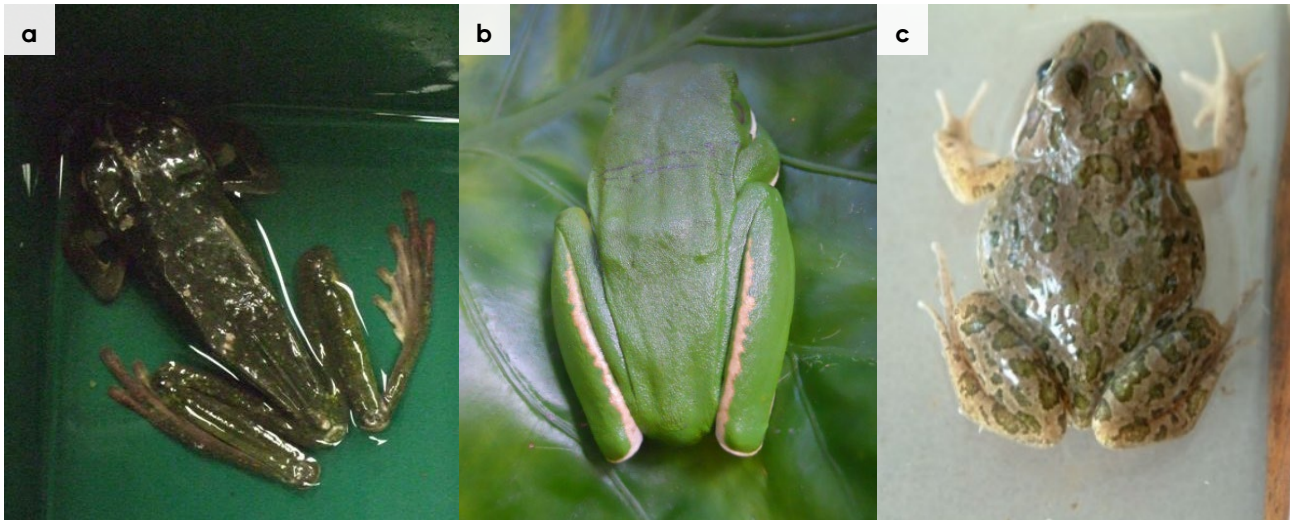



Photo credit: Anne Fowler

### 4.5.2. Ongoing monitoring of health and welfare

The aim of wildlife rehabilitation is to ensure animals recover and can be released back to the wild as quickly as possible. Careful, daily monitoring is required to ensure that animals are responding as expected to the treatment being provided and so that any deterioration or welfare concerns can be identified and addressed as soon as possible. Rehabilitators should ensure that record-keeping is a priority to maximise positive welfare outcomes. Templates to assist wildlife rehabilitators to record and monitor wildlife health and welfare can be found in the appendices to Part A of these guidelines. These records will be valuable tools to share with veterinarians to support decision-making.

The following is recorded daily:

- ☑ demeanour
- ☑ food consumption
- ☑ faecal/urine output
- ☑ behaviour observed
- ☑ medical treatment provided
- ☑ evidence of overnight activity.

The following is recorded weekly:

- ☑ weight
- ☑ body condition.

Over time, regular monitoring will also help to develop carer skills and knowledge, as regular observations and recording will result in a deep understanding of the expected behaviour and response to treatment for the species in care.

**Species specific considerations:**

- The frog should be observed at least daily.
- Note the frog's demeanour and behaviour every time food is introduced or taken away, the frog is medicated or the enclosure is cleaned. Pay particular attention to any changes that have occurred since the previous day.
- A healthy frog should be sitting in a tucked position with its legs against its body and eyes open.
- A frog lying flat with legs out and eyes closed needs veterinary attention.
- Frogs are unlikely to imprint onto humans. However, they can become tolerant of handling, so this should be kept to a minimum during rehabilitation.
- Note faecal consistency daily. The frog should pass solid brown faeces. If diarrhoea is noticed, a faecal sample should be collected and submitted to the veterinarian for assessment as soon as possible. Do not treat on suspicion of a bacterial or parasitic infection, as this can make definitive diagnosis very difficult and potentially prolong the course of the disease.

### 4.5.3. Common presenting injuries and clinical signs of emerging health conditions

Clear guidance on conditions that may require euthanasia can be found in Part A of these guidelines.

**Table 4.5** lists common clinical signs and possible causes of injury/disease. Carers should be aware that these are not exhaustive. Aside from first aid, carers should avoid administering medications prior to the provision of veterinary advice.

Unusual clinical signs or mass mortality events – a number of animals dying or found dead at the same time, with similar signs – may indicate an emergency animal disease, an emerging/new infectious disease or an environmental/human related toxicity which needs further investigation. Report these immediately to the Emergency Animal Disease Watch Hotline on 1800 675 888 (24 hours).

**Table 4.5 Common injuries and clinical signs of emerging health conditions seen on presentation or during care**

| Injury or clinical signs | Possible causes | Carer observations and response |
|---|---|---|
| Note: Do not provide pain relief or other medication, including antibiotics, unless under veterinary guidance and supervision, as these can have severe side effects, particularly in dehydrated/shocked animals. Use of antibiotics when not indicated can contribute to antimicrobial resistance and reduce drug efficacy. | | |
| **Fracture**<br>**Nose trauma** | Injury by predation<br>Accident<br>Rubbing nose on the side of the enclosure | • **Seek urgent veterinary attention. Do not delay transfer to a veterinarian to apply first aid, other than to stop excessive bleeding.**<br>• Do not attempt to stabilise fractures as this is very painful and risks making the injury worse. Fracture stabilisation should only be attempted by a veterinarian following physical examination, x-rays and under general anaesthesia, with appropriate pain relief.<br>• Do not provide pain relief or other medication unless under veterinary guidance and supervision, as these can have severe side effects, particularly in dehydrated/shocked animals.<br>• Block the glass with a piece of cardboard, or something similar, to create a visual barrier and stop the frog from rubbing.<br>• Mild cases of rostral trauma can be cleaned with a dilute salt solution (1 g salt in 40 ml fresh water) applied to the affected area 1–3 times per day. |
| **Swelling**<br>**Bleeding**<br>**Skin wound, puncture** | Injury from predation<br>Garden tool injury or other accident | • **Seek urgent veterinary attention. Do not delay transfer to a veterinarian to apply first aid, other than to stop excessive bleeding.**<br>• Do not provide pain relief or other medication unless under veterinary guidance and supervision, as these can have severe side effects, particularly in dehydrated/shocked animals. |

| Injury or clinical signs | Possible causes | Carer observations and response |
|---|---|---|
| **Tacky skin**<br>**Shriveled appearance** | Dehydration | • **Seek veterinary attention.**<br>• Place the frog in a shallow bath of cool, aged or filtered water. |
| **Poor body condition**<br>**Inappetence**<br>**Lethargy**<br>**Discoloured, ulcerated or sloughing skin**<br>**Red legs** | Chytrid fungus (see **Figure 4.4**)<br>Ranavirus<br>Bacterial infection | • **Seek veterinary attention.**<br>• The frog may show no clinical signs and still have chytrid.<br>• If chytrid infection is confirmed (by a skin swab submitted to the laboratory), the frog should be euthanised. The welfare of wild frog populations overrides the fate of the individual. This action complies with the Federal Threat Abatement Plan for this disease.<br>• The prognosis for an individual with chytrid is poor, affected frogs often die from the disease.<br>• Skin ulcers and red legs could also be indicative of ranavirus infection or a bacterial infection. The prevalence and susceptibility of Australian frog species to ranavirus infection is not known. If this infection is suspected, it must be reported immediately. |

**Figure 4.4** a. Great barred frog with chytrid infection. Note the excessive amount of skin sloughing. b. Green tree frog with chytrid. Note the red skin on the legs and under the body

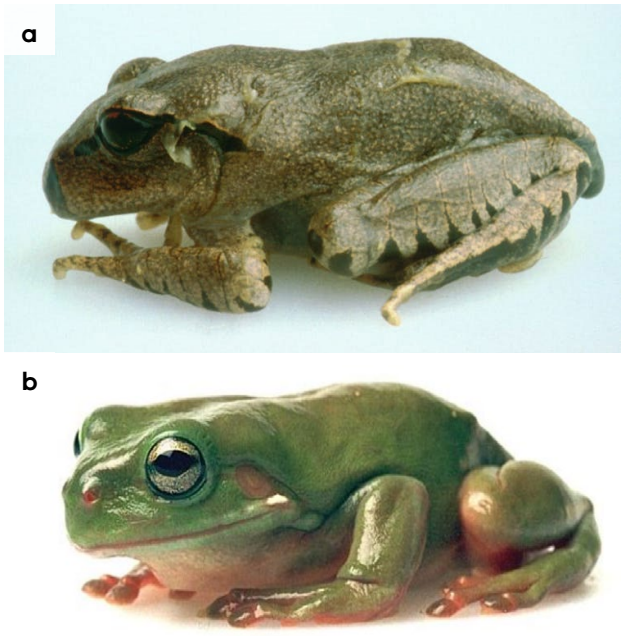



Photo credit: Lee Berger

### 4.5.4. Administering treatment

- Oral medication can be delivered by opening the mouth of the frog using a tongue depressor, guitar pick or credit card.
- Frog skin is quite permeable. Some medications can be administered topically or as a bath. Follow veterinary directions.

# 4.6 Housing

Below are several key considerations when housing frogs in care.

## 4.6.1. General housing information for frogs

**Table 4.6** Key aspects of housing for frogs during rehabilitation

| Term | Parameter |
|---|---|
| Housing | • All frogs need to be housed individually for quarantine reasons and to avoid aggression and cannibalism.<br>• Do not house wild frogs near pet frogs.<br>• Sick frogs must be kept in an enclosure that can easily be kept clean – rather than a display cage for a healthy pet. |
| Cage furniture | • The habits of the frog species will determine the cage furniture requirements:<br>- Burrowing frogs (eastern banjo frog) and frogs that hide under rocks and leaf litter (eastern common froglet, green and golden bell frog, growling grass frog and spotted marsh frog) should be offered soft soil or sphagnum moss for burrowing and rocks or bark for hiding. Rocks should not be too heavy otherwise they can pose a crush risk. Commercially purchased sphagnum moss contains high levels of ammonia so should be rinsed thoroughly before use. Coco peat is also a good burrowing frog substrate. Substrate changes should be completed frequently.<br>- Tree frogs (Peron's tree frog and southern brown tree frog) need branches to climb on and plants to hide under. Wash plants thoroughly before use and place bark in the pot to ensure frogs are not coming into direct contact with fertilisers in potted plant soil.<br>- Stream-dwelling frogs (Blue Mountains tree frog, leaf green tree frog, Lesueur's frog and spotted tree frog) require free-flowing water and access to rocks to hide under. |
| UV light | • Do not house frogs in direct sunlight. Some vegetation or browse can be used to provide a dappled shade but still allowing some UV through.<br>• A normal day/night cycle should be provided with the use of a full spectrum light globe that emits both UVA and UVB. This is important for good bone health/density, particularly for frogs in long term rehabilitation settings. |
| Temperature | • Provide a temperature range of 17–23°C.<br>• A sick frog should be housed at the higher end of the range.<br>• Heat may be offered with a 25W lamp at one end of the cage.<br>• Monitor the temperature with a thermometer to prevent over-heating.<br>• Displaced tropical frogs can be kept in the short term at 25–28°C. Water temperature should be maintained in the same range. |

| Term | Parameter |
|---|---|
| **Humidity** | • Provide a humidity level of 30–60% for Victorian frogs.<br>• Displaced tropical frogs require a humidity range of 60–80%.<br>• Humidity is maintained by spraying walls and foliage with boiled water or rainwater.<br>• Maintaining appropriate airflow is equally important as humidity i.e. do not use completely sealed enclosures. |
| **Water** | • A water bowl for swimming and toileting needs to be large enough that the frog can completely sit in it.<br>• If used with sick frogs, it needs to be shallow enough to prevent the frog from drowning and should contain branches, flat rocks, or pebbles to enable the frog to climb out.<br>• For very sick frogs, use damp paper towel instead.<br>• Water bowls must be changed daily.<br>• Use of water from local waterways is not recommended as it may be polluted or transfer chytrid fungus.<br>• Tap water should not be used straight from the tap. Leave to stand for 24–48 hours to remove chlorine before allowing any frog contact. A less desirable alternative is to treat it with a water aging conditioner.<br>• For frogs that spend more than 50% of their time in the water, water quality must be tested weekly and meet the following parameters: Alkalinity > 50 mg/litre calcium carbonate, hardness = 75–150 mg/litre, pH = 6.5–8.5, salinity < 0.4 ppm, conductivity = 50–2000 µS, unionized ammonia < 0.02 mg/litre, nitrite < 0.1 mg/litre, nitrate < 50 mg/litre.<br>• If ammonia, nitrite and nitrate build up, at least 20% of the water should be changed weekly. |
| **Air quality** | • Frogs are sensitive to aerosol sprays (e.g. deodorants, hairspray, fly spray), smoke and household cleaning products. |

### 4.6.2. Enclosure hygiene and biosecurity

General information about hygiene and biosecurity can be found in Part A of these guidelines. New diseases emerge frequently and sick and injured animals in care are often more susceptible to picking up pathogens from the environment. It is important to maintain the highest levels of hygiene to avoid inadvertently transferring diseases between animals and from humans, and to protect the wild population where the animal will eventually return to.

**Species specific considerations:**

- Wash hands with soap and water after handling frogs to minimise the risk of infection with zoonotic disease agents such as *Salmonella*.
- Gloves must be worn when working with and handling frogs and changed between each frog.
- Left-over food and faecal matter should be spot cleaned daily from enclosures to ensure good levels of hygiene are maintained.
- Enclosures used to house sick/injured frogs, must be cleaned and disinfected between inhabitants.
- Enclosures and non-porous furniture should be cleaned with hot soapy water and then disinfected with 1% bleach or F10 SC diluted 1:250 and a 30-minute contact time. Enclosures and furniture should be thoroughly rinsed after disinfecting.
- Substrate should be completely replaced and furniture, such as branches or boxes made of unsealed wood, should be discarded as they cannot be effectively disinfected.
- Cage furniture, such as rocks, should be dried in sunlight or heated above 38°C for a minimum of eight hours before being used in the enclosure.
- To minimise the risk of spreading chytrid fungus, water used in an enclosure to house wild frogs should not be tipped directly down the sink. It should be treated in one of the following ways:
  - With F10 SC (1 ml F10 SC in 250 ml water) for a minimum of one minute and then poured onto soil.
  - With bleach (4% solution) 1 ml in 9 ml water for 10 minutes or 1 ml in 29 ml water for 40 minutes then discharged into the sewerage system.
  - By boiling the water continuously for two minutes. Allow the water to cool and then pour onto soil.

### 4.6.3. Housing types

Different set ups are required for animals at different stages of treatment and care. **Table 4.7** describes the housing type, suggested dimensions and requirements at each stage of care.

**Table 4.7** Rehabilitation housing for frogs. TBL = Total body length

| Intensive care housing | | |
|---|---|---|
| **Indications for use** | **Suggested min. dimensions** | **Suggested requirements** |
| Short-term critical care (<48 hours).<br>One frog per container.<br>Longer periods under veterinary supervision where strict cage rest/confinement is indicated. | Enclosure:<br>0.4 x 0.4 m (0.16 $m^2$) x 0.4 m (H) | **ENCLOSURE CONSTRUCTION**<br>• Ice-cream or take-away food container or plastic tub with a lid.<br>• Ensure the enclosure has adequate ventilation.<br>**ENCLOSURE FURNISHING**<br>• Plastic cup or another receptacle used as a hide.<br>**ENVIRONMENTAL VARIABLES**<br>• The enclosure should be heated to between 17–23°C.<br>• Damp paper towels can be used to provide humidity for very sick frogs.<br>**PROVISION OF FOOD/WATER**<br>• A small amount of water that is just deep enough to cover the hind legs can be left in the container.<br>• Frogs are fed in a separate container and water is changed weekly. |

| Intermediate and pre-release housing (treatment/cage rest) | | |
|---|---|---|
| **Indications for use** | **Suggested min. dimensions** | **Suggested requirements** |
| Provision of daily medication, close monitoring once animal is stabilised and no longer requires intensive care.<br><br>Enclosure furnishings can be arranged to reduce opportunities to climb or move excessively so that 'cage rest' can be achieved with slightly more space/reduced contact. | **Terrestrial frog enclosure:**<br><br>Length > 20 x TBL<br><br>Height > 10 x TBL<br><br>**Arboreal frog enclosure:**<br><br>Length > 10 x TBL<br><br>Height > 20 x TBL<br><br>TBL = Total body length | ENCLOSURE CONSTRUCTION<br>• Glass aquarium with lid to prevent escape or a purpose-built frog vivarium.<br><br>ENCLOSURE FURNISHING<br>• Suitable substrates include peat, sphagnum moss or river pebbles that are large enough not to be swallowed. The substrate should be 10 cm deep.<br>• Branches.<br>• Rocks.<br>• Water bowl large enough for the frog to be able to sit in.<br><br>ENVIRONMENTAL VARIABLES<br>• A normal day/night light cycle should be provided with a full-spectrum basking light, or a combination of lamps to provide both visible and UV light. **These must be replaced as per the manufacturer's guidelines**. UV meters are available commercially to measure UV output. Nothing should be positioned between the frog and the light source. Glass and most plastics filter out UV light, while metal mesh decreases the amount of UV light that reaches the frog by 30–50%.<br>• A heat lamp should be placed at one end of the enclosure to provide a gradient, allowing the frog to regulate its body temperature by moving through the gradient. A thermometer should be used to monitor the temperature.<br><br>PROVISION OF FOOD/WATER<br>• Placing food on particulate substrates should be discouraged to prevent substrates being swallowed by the frog. |

**Figure 4.5** Intensive care housing with basic cage furniture: a cup to hide in, a shallow water bowl and a branch.

Photo credit: Zoos Victoria

**Figure 4.6** An intermediate/pre-release enclosure for frogs. There are branches for climbing and leaves for hiding.

Photo credit: Zoos victoria

# 4.7 Feeding and nutrition

Keeping daily records of food offered (item and volume fed) and food consumed is good practice and will allow the rehabilitator to observe how an animal is responding to food on offer and inform future choices.

**Please note: Food suppliers and specific products mentioned in these guidelines are intended as examples only. Other suitable products may also be available.**

Fresh water must be always available, provided in a stable/non-spill bowl. Water must be changed daily.

Caution is required when feeding mealworms. Their exoskeleton is indigestible and can cause serious digestive issues. Feed mealworms as a supplement only and in small quantities. Ensure relative size and quantity of mealworms and size of animal is considered and calculated prior to feeding.

**Table 4.8** Feeding and diet guide for frogs during rehabilitation

| | |
|---|---|
| **Captive diet** | Crickets, cockroaches, mealworms (occasionally), flies, fly pupae, moths (no silk moths). Insects should be smaller than the distance between the frog's eyes. |
| **Supplements** | Gut load invertebrates with Wombaroo Insect Booster or Vetafarm Herpagrub for a minimum of 24 hours prior to being fed out. Dust with calcium carbonate for at least one feed/week. |
| **Feeding frequency** | Every other day. |
| **Amount to feed** | About five invertebrates per individual. |
| **Food placement** | Place live invertebrates in the enclosure. |
| **Uneaten food** | Replace daily. |

**Figure 4.7** Enclosure used to hold crickets prior to feeding. Note the piece of egg carton, used to provide somewhere to hide, the yellow lid containing Insect Booster and the jar containing water.

Photo credit: Zoos Victoria

# 4.8 Release protocol

Ideally, frogs will be rehabilitated and released in a short timeframe. If this is not possible and the frog is in care for significant extended periods, ensure that it is regularly assessed against the five welfare domains to support decision-making. Frogs in care for extended periods may have a reduced ability to survive in the wild. Talk to your veterinarian and consider whether euthanasia will provide the best welfare outcome for such frogs.

## 4.8.1. Pre-release assessment

Pre-release assessment of animals in care is essential to support improved outcomes once back in the wild. Frogs should be assessed based on body condition, fitness and the ability to engage in natural species-specific behaviours prior to release.

The following check list should be used to guide decision-making regarding release suitability for frogs:

- ☑ Individual is in a state of good health – presenting injury/sickness is completely resolved (consider pre-release veterinary check).
- ☑ Individual is within a healthy weight range and appropriate body condition (see **Table 4.1**).
- ☑ Individual displays ability to actively forage for and consume natural foods.
- ☑ Individual moves normally. Arboreal frogs climb branches.

## 4.8.2. At the release site

Post release survival will be maximised by ensuring that both the release site and the way in which the animal is released are carefully considered.

Frogs require the following:

- A supply of invertebrates.
- A variety of shelters, such as rocks, fallen wood or reeds.

For more information on the ecological characteristics and requirements of frogs that may help with their release, please refer to **Table 4.1**.

## 4.8.3. Release checklist

### Release location

**Check all of the requirements of your authorisation are being met, and consider the following:**

- ☑ Different frog species may be diurnal or nocturnal (see **Table 4.1**). Release should be timed to coincide with the species' peak period of activity.
- ☑ Frogs are best released while temperatures are in the range of 15–25°C.
- ☑ They should not be released when the temperature is below 15°C as they will likely be in torpor in the wild.

### Release Procedure

- ☑ Return the frog to its original capture location to minimise the risk of spreading chytrid fungus.
- ☑ Select a feature that provides some protection from predation, such as leaf cover, rocks or logs and place the transport container on its side to permit the frog to hop away in its own time.

# 4.9 Key references and additional reading

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