



FROG HUSBANDRY GUIDE

Husbandry Guide for Frogs in Care

This guide does not constitute training nor is it a whole manual. Its intended purpose is to provide a basic overview of frog husbandry to assist WIRES members with the temporary care of frogs during the 2021 mass mortality event. It is recommended that members have completed the online Reptile Care Course.

Contents

Identification.....	1
Facts about frogs.....	1
Mass Mortality Event.....	2
Hygiene and quarantine protocols	3
Handling.....	4
Triage	4
Chytrid Testing.....	5
Housing requirements	6
Size.....	6
Light.....	6
Temperature.....	7
Substrate and furniture	7
Water	7
Humidity.....	8
Feeding.....	8
More information	9
Vets	10

Identification

The most commonly cared for species is the Green Tree Frog (*Litoria caerulea*). It is also the most reported species being affected by the current mortality event.

Correct identification is important for reporting purposes and in understanding the husbandry needs of individuals in care. There are a number of great field guides available for frogs in Australia and the Australian Museum has some great online tools that can be found at:

<https://australian.museum/learn/animals/frogs/>

Additionally, you can email the Australian Museum for assistance with identifying a frog at calls@frogid.net.au



Figure 1. Commonly encountered frogs in NSW. A. Green Tree Frog (*Litoria caerulea*) B. Red-eyed Tree Frog (*Litoria chloris*) photo credit: D. Dendrinis C. Peron's Tree Frog (*Litoria tyleri*) photo credit: D. Dendrinis

Facts about Frogs

- The IUCN Red List of Threatened Species states that globally, 40% of amphibian species are threatened with extinction
- This makes amphibians the most threatened class of vertebrates
- A group of frogs is called an army
- There are more than 240 species of frogs in Australia
- Most species are nocturnal
- Frogs have permeable skin that they can breathe through.
This is known as cutaneous respiration
- Only the males call
- Frogs are considered bio-indicators and can tell us a lot about the health of an ecosystem

Mass Mortality Event

Frogs have been reported sick and dying in large numbers all along the east coast of Australia. A combination of a highly infectious disease known as Chytridiomycosis (Chytrid), cool temperatures or possibly an unknown, exotic pathogen are suspected to be the cause.

NB: As a result, National Parks and Wildlife Service have requested that any frog coming into care, remain in care and not be released while they investigate the cause of the current mortality event.

Frogs cannot be transferred to other groups, including FATS, at this time.

NPWS are unable to comment on how long frogs need to remain in care at this stage. If a branch is struggling with the number of frogs in care, please contact Head Office at Hannah.ryan@wires.org.au and we will assist branches in finding alternative arrangements.

There are several infectious diseases that can seriously compromise a frog's chance of survival. The most common is the highly infectious Chytridiomycosis also known as chytrid caused by the fungus *Batrachochytrium dendrobatidis* (BD). BD thrives in cool environments and can be found in water and soil and infects the skin of frogs. Chytrid is not a zoonotic disease i.e. the disease cannot be passed from frogs to humans.

The disease may not kill frogs immediately, and they can swim or hop to other areas before they die, spreading fungal spores to new areas. This means it is very important not to move or release frogs from one area to another.

A frog infected with chytrid can show no symptoms at all or can present with the following:

- Abnormal posture and behaviour. Frogs may sit with their hind legs out, wobble or show difficulty moving or fleeing, or may even have a seizure.
- Skin changes. The skin may be discoloured, peel, or possibly ulcerated. The body may swell.
- Be lethargic and have no appetite
- Sudden death



Figure 3. Great barred frog (*Mixophyes fasciolatus*), a lethargic frog with shedding skin accumulating on the body. Photo credit: L. Burger.

More information on BD can be found in the [Wildlife Health Australia Factsheet Amphibian chytrid fungus in Australia](#).

Frogs that are being found during this mortality event are presenting with similar symptoms to chytrid. Specifically, they are found out during the day, are lethargic, discoloured, usually red to brown in colour, emaciated with red bellies and feet and excessive skin sloughing.

It is important to note that other diseases (such as ranavirus, myxosporean parasites and trypanosome parasites) have also been responsible for native frog mass mortality events in Australia and the exact cause of this current mortality event is still being investigated. It is also possible a novel or exotic pathogen or new strain of chytrid could be behind the current mortality event. Exercise the following hygiene and quarantine protocols with any frog coming into care, regardless of whether or not they are presenting with chytrid symptoms.

Hygiene and quarantine protocols

Good hygiene and quarantine protocols are essential to the care and rehabilitation of frogs.

You can find information about Work, Health and Safety in your Rescue and Immediate Care Course (RICC) Manual (accessible via Tall Emu).

When working with frogs you should be mindful of the potential for zoonotic disease transmission and that some frogs can secrete toxins from their skin that may be harmful. The use of disposable gloves and proper hand hygiene practices are important to minimise these risks when working with frogs.

To reduce the spread of chytrid and other diseases it is imperative that you maintain strict hygiene and quarantine protocols. This includes:

- Wearing a new pair of disposable latex gloves for each individual frog
- Wearing a new pair of gloves for each enclosure for example when cleaning, disinfecting or changing water
- Individuals should be isolated and kept in separate enclosures. With the exception of individuals rescued at the same time and location. Where possible though it is still recommended that these animals be kept separate
- Enclosures, equipment and cleaning instruments should be disinfected with F10 or bleach solution (1 part bleach: 9 parts water) with 10-15 minutes contact time
- Contaminated water should be disinfected with bleach (1:9) or F10 (1:2000) prior to disposal. This water can then be poured down the toilet where it will undergo further treatment.
- Equipment should be cleaned and sterilised with F10 or bleach between use and a set should be provided for each individual animal
- Enclosures should be cleaned regularly

The [NSW Code of Practice for Injured, Sick and Orphaned Protected Fauna](#) (the Code) also lists important standards for hygiene and quarantine under section 8.2. *Controlling disease transmission between animals*.

Handling

Damp disposable gloves should be worn when handling a frog. This is because their skin is very absorbent making them sensitive to the oils and chemicals from our hands. If you do not have gloves on you make sure that your hands are thoroughly washed with soap and dried and then dampened prior to free handling any frogs. Overhandling can kill frogs so only handle them when necessary. It can also remove some of the beneficial antifungal properties of their skin, making them more susceptible to infection.

Hold a frog by placing the animal on the palm of one hand and securing it with your other hand or thumb just behind the head. Hold firmly so that the animal cannot escape but be sure not to hold too tightly. Covering the head with your other hand can assist in calming the animal and make it less likely that it will try and jump to escape.

When rescuing a frog, it should be placed into a container lined with a damp cloth. Small plastic aquariums or takeaway containers with air holes for ventilation are ideal and can also be used for transporting frogs.

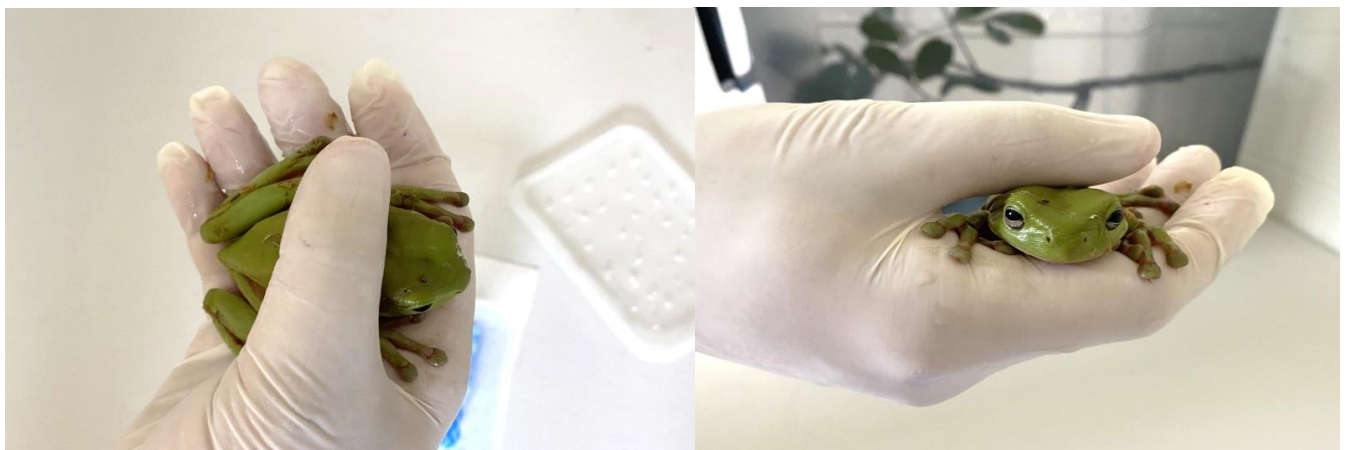


Figure 4. Handling a frog

Triage

The current cause of the widespread mortality event is unknown. Frogs are appearing out during the day and are discoloured, usually brown, lethargic and slow moving with excess skin sloughing. Many frogs are dying within the first 24 hours after being found and so proper triage is critical.

If the animal is moribund (limited response to stimuli), unresponsive or injured seek veterinary treatment immediately. Consider euthanasia if they are moribund and have obvious pelvic bones (very emaciated) and are darkly discoloured as they have a very grave prognosis.

If you receive multiple frogs at one time, start with the youngest and healthiest individual first and work your way to the oldest and sickest to reduce the risk of disease transmission (Guideline 8.2.2.1 in the Code). Remember to implement proper hygiene protocols between each new frog, specifically, wearing a new clean pair of gloves for each individual and sterilising equipment.

Initial care for sick frogs is to provide a warm environment at 30°C. A small quantity of electrolyte solution (e.g. sugar free Gatorade or Hartmann's solution) into a water bowl can also be provide to

allow the animal to soak in the water and rehydrate. The water level should enable the frog to keep its head out of the water to avoid the risk of drowning. This water must be changed daily. Further to this, bathing the animal in an F10 bath diluted at 1:2000 for 5 minutes a day for 12 days is recommended.

We are in a position to assist organisations that are currently investigating the cause of this mass mortality event. There are two key pathways that this is occurring:

1. If your veterinarian recommends euthanasia of a frog or it has died within 24 hours, please ask your vet to contact Jane Hall at the Australian Registry of Wildlife Health on 0428 789 764 as soon as possible to arrange collection or testing. This is to assist the Registry with determining what the cause of the current outbreak is.
2. If you have a deceased frog please contain it in a plastic zip lock bag with the location and date written on the bag and freeze it for collection. Contact Jodi Rowley at the Australian Museum via calls@frogid.net.au. Please note collections may be delayed during this time due to COVID restrictions. This will assist with ongoing investigations into the mortality event.



Figure 5. Sick frogs that have come into WIRES care during the mortality event

Chytrid Testing

The Code specifies that if a frog is rescued it must be euthanased (Standard 7.1.1.2) however WIRES has been working with National Parks on a case by case assessment to enable certain individuals to be released.

Under ordinary circumstances, there are two primary criteria for release – the location the frog originated from is known and the frog has had a chytrid test and the results were negative. Once we have this information we can submit a request to NPWS to have the individual released back to its original location.

Please remember that no frogs are to be released at this time, as directed by NPWS, even if they test negative for *chytridiomycosis*.

A veterinarian will need to collect a sample to be sent for testing. To arrange for a frog to receive a chytrid test you must contact the WIRES Welfare Coordinator, Zoe Harrison via (02) 89773 384 or zoe.harrison@wires.org.au.

A swab will need to be taken from the frog by a veterinarian and the sample sent to Cesar Australia, a laboratory in Victoria. A dry swab of the skin should be taken. The lab responsible for the testing recommends medi wire MW100 or similar fine tip plastic shaft dry swabs. The veterinary clinic will need to take one swab each frog. The swab should be rolled on the skin 40 times - 5 on the dorsal surface, 5 on the ventral surface, 5 on each lateral surface and 5 on each leg.

Your vet can then send the swabs to Cesar Australia (Level 1, 95 Albert Street Brunswick, Victoria, 3056 Australia). They should include an accompanying letter/spreadsheet with sample details. This should include the WIRES callsheet number, species, location and circumstances found.

If an animal tests positive for chytrid, your vet will prescribe the appropriate course of treatment for that animal. Once treatment is complete the frog will need to undergo another test and return a negative result prior to being released (once NPWS has advised frogs are able to be released).

Housing requirements

The risk of introducing disease in a frog enclosure is high and so this should be at the forefront of your mind when housing frogs. Ensure any materials used are easy to clean and disinfect or are disposed of after use.

Size

Frogs can fit through small holes and cracks so ensure that your enclosure is escape proof. Enclosures should be kept in a warm and quiet area where frogs cannot come into contact with pets, pests and other wild animals.

The recommended housing sizes for frogs in the [NSW Code of Practice for Injured, Sick and Orphaned Protected Fauna](#) are listed below in metres:

- Intensive care – 0.4L x 0.4 W
https://www.bunnings.com.au/ezy-storage-waterproof-ip67-storage-box-75l_p0204843
- Intermediate care – 0.6L x 0.4W x 0.4H
<https://www.reptileone.com.au/products/housing/46137>
https://www.bunnings.com.au/ezy-storage-100l-waterproof-ip67-storage-box_p0219758

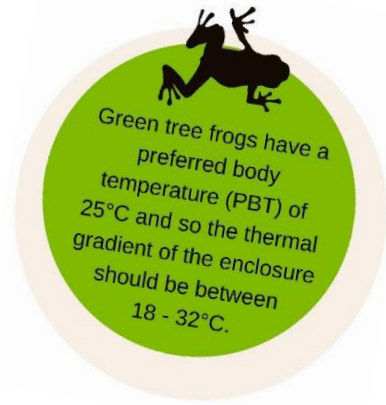
NB: The linked products are just examples of enclosures that meet the guidelines set out in Code. If using plastic tubs you **must** add air holes for ventilation.

Light

Frogs need access to a regular photoperiod i.e., day and night light cycle. Positioning your enclosure within view of a window so that the frog gets indirect light is sufficient for this. Ensure, however, that the enclosure is not exposed to direct sunlight. Alternatively, commercially available low level UVB lights can be used. Many species of frog, particularly the tree frogs, are adept climbers so it is important that they cannot touch any light or heat source and burn themselves.

Temperature

Frogs need a consistent temperature to maintain optimum health. While heat can be used for treating frogs with certain diseases (see triage section), it is important when housing frogs to provide a thermal gradient. This means creating a high temperature section at one end and a low temperature section at the other end of the enclosure, allowing the frog to move around and select its preferred temperature. A thermometer and thermostat must be used to measure the temperature within an enclosure.



Substrate and furniture

Substrate is not required for tree frogs although you can provide rocks and branches for climbing. If housing burrowing frogs, substrate is important and should mimic the natural habitat of the species. Substrate should be at least 10cm in depth and can include sphagnum moss, leaf litter and soil (not potting mix). Any substrate material should be sterilised prior to its use by using a diluted F10 solution and drying it out in the oven under low heat for 2-3 hours.

Non-bleached paper towel or cloths can be used as a substrate and may be particularly useful in intensive care housing to assist with hydration. It is important that the substrate is moist but not wet so as to avoid the build up of bacteria and potential for respiratory issues.

A selection of hides that allow an individual to retreat should be included in the enclosure. This can include natural hollows (cleaned and heat treated first), plastic pot plants or PVC piping.

Any furnishings used should be securely placed so that they do not fall and injure the animal in the enclosure. In addition, avoid sharp or protruding objects that a frog could injure itself on. Any substrate, rocks or branches should be disposed of after use or if using artificial furnishings, sterilised with bleach or F10 and cleaned before reuse.

Substrate should be spot cleaned immediately when soiled and enclosures should be cleaned out completely with new substrate and furnishings every few days.

Water

Frogs lose a lot of water through their skin and because of this you need to ensure that you provide clean water daily. The sensitivity of their skin means that not all water is suitable as toxins and chemicals in the water will be absorbed through the skin. Aged water is the most appropriate to provide for frogs, which involves letting the water sit for 24 hours allowing any chlorine in the water to evaporate.

Water bowls should be large enough that the frog can fit its entire body inside. Similarly, the water level should allow the frog to submerge its whole body but keep its head above the water (see figure 6).

If a frog is sick and at risk of drowning, place a rock in the bowl to provide it with an easy option for getting out of the water. Water bowls should be cleaned and fresh water should be provided daily.

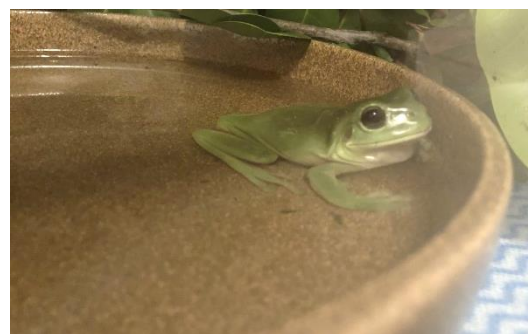


Figure 6. Green tree frog submerging its body in water bowl.

Humidity

Providing a moist and humid environment for frogs is important and can assist with hydration. The humidity level required will vary depending on the species but humidity between 50 – 70% is advised. Humidity can be increased by using a spray bottle with aged water to mist throughout the enclosure.

An environment that is too humid can have deleterious effects on the health of a frog and increase the opportunity for bacteria to grow. If there is condensation within the enclosure, then the environment is too humid. If this is the case, there may not be enough ventilation and air flow within the enclosure or you may be over-misting. A hygrometer can be used to measure the humidity levels in the enclosure.

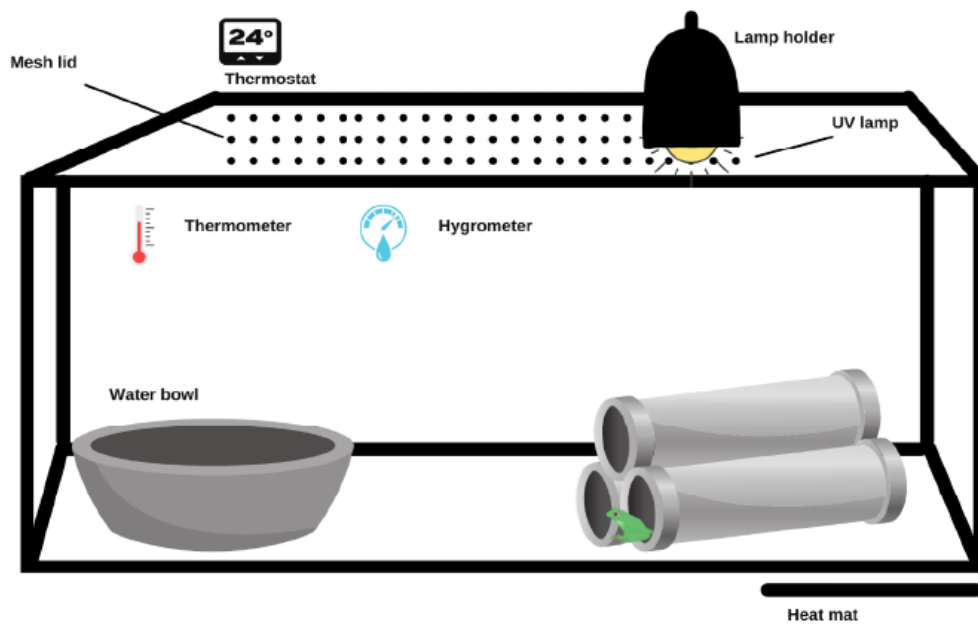


Figure 7: Example of a frog enclosure setup

Feeding

Frogs are ambush predators and require live prey. A variety of insects should be offered, and crickets, mealworms, wood roaches and other insects are appropriate.

Frogs require warm temperatures to digest food so if you find that a frog in care is not eating be sure to check the temperature of your enclosure. It may take a few days for a frog to eat when first in care.

Prey items should be appropriate to the size of the animal being fed. As a guide, don't feed anything that is bigger than the space between the frog's eyes.

Frogs should be fed every 2-3 days. Don't overfeed and make sure to clean up any uneaten prey items.

More information

The frog mortality event is an evolving situation and we will continue to provide information as it becomes available. Please ensure you are in regular contact with your Reptile Coordinator regarding any frogs in care.

Please note that WIRES is currently in the process of developing a frog rescue and care course to support members caring for frogs and improve outcomes for these animals. Details regarding this course will become available at a later date.

If you have any questions regarding this document, please contact training@wires.org.au.

Please see the link to the webinar below for more information on the current mass mortality outbreak.

[Australian Museum: Help Save Australia's Frogs](#)

Vets

There are a number of vets that are known to work with frog. Some of these are listed below:

Bowral Veterinary Hospital

Bowral, NSW

02 4861 1444

<https://www.bowralvethospital.com.au/ReptileCare.aspx>

Byron Bay Wildlife Hospital

Byron Bay, NSW

0437 818 883

<https://www.byronbaywildlifehospital.org/>

Canley Heights Vets

Canley Heights, NSW

02 9604 9792

Gerringong Veterinary Hospital

Gerringong, NSW

02 4234 1317

<https://www.albionparkvet.com.au/exotic-animal-service>

Merimbula Veterinary Clinic

Merimbula, NSW

02 6495 1261

<https://www.merimbulavet.com.au/>

North Shore Veterinary Specialist Centre

Artarmon, NSW

02 9436 4884

<https://www.exoticsvet.com.au/>

Small Animal Specialist Hospital (SASH)

North Ryde, NSW

02 9199 7250

<https://sashvets.com/services/avian-exotic-vet-clinic/reptile-vet/>

Somersby Animal Hospital

Somersby, NSW

02 4372 1799

<https://www.sahvet.com.au/>

Taronga Zoo Wildlife Hospital

Mosman, NSW

02 9969 2777

Summary

- 👉👉 NPWS have directed that no frogs are to be released or rehomed until further notice
- 👉👉 The current cause of the mortality event is still unknown
- 👉👉 Strict hygiene, quarantine and biosecurity measures are imperative. Use new gloves for each animal and enclosure
- 👉👉 Seek veterinary treatment as soon as possible
- 👉👉 Initial care involves keeping the animal in a warm environment at 30°C
- 👉👉 Frogs require a clean, humid environment to thrive. Ensure they always have access to clean fresh water (replaced daily) and that the enclosure is thoroughly cleaned every few days
- 👉👉 If a frog requires euthanasia contact the Australian Registry of Wildlife Health
- 👉👉 Any dead frogs should be frozen in a zip lock bag and an email should be sent to calls@frogid.net.au
- 👉👉 If you have any questions please contact training@wires.org.au