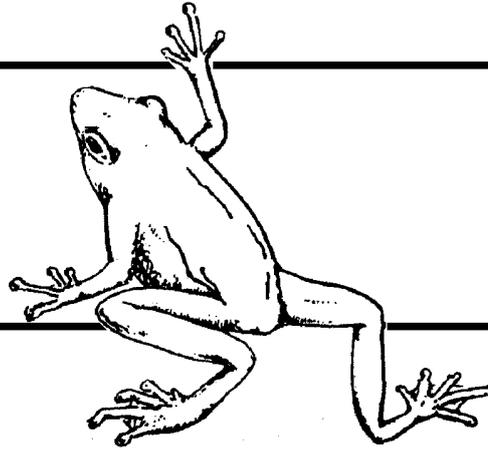

FROGFACTS

No. 6



The Frog and Tadpole
Study Group of NSW Inc
FATS GROUP

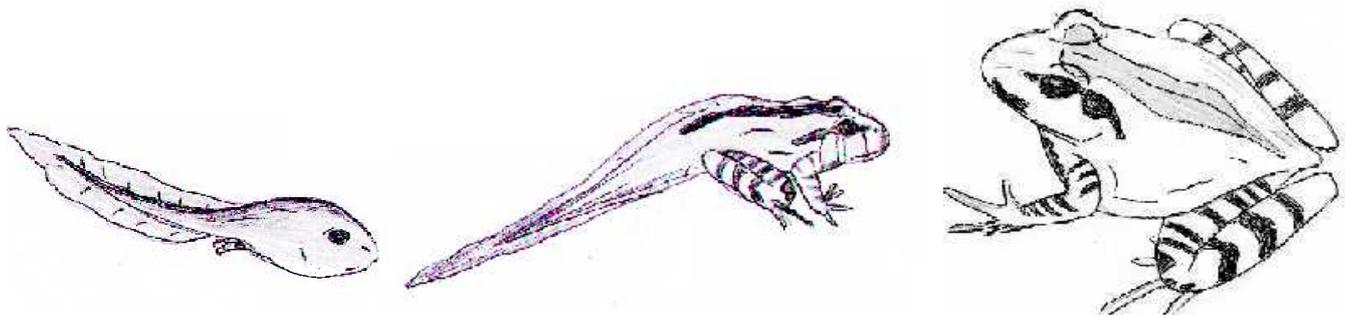
P.O. Box 296
Rockdale 2216

COLLECTING, RAISING AND RELEASING TADPOLES

Introduction

Most frogs produce free-swimming tadpoles when they breed. A few species of frogs can bypass this stage using a series of elaborate breeding tricks. This information sheet deals with only those species that have an aquatic tadpole. All Australian tree frogs and most Australian ground frogs follow the standard pattern of having aquatic tadpoles, and the raising requirements for them are similar. Information about frogs that do not have an aquatic tadpole stage can be found in other *FrogFacts*.

There are many different ways of rearing tadpoles in aquariums or in garden ponds, and a few of the most successful and practical techniques are explained here. You can avoid heavy tadpole losses and reduce environmental problems if you follow these simple steps.



See how they change

Being able to witness the life cycle of frogs is one of the most rewarding nature experiences that anyone can have access to.

Successfully rearing tadpoles can be a source of achievement for young and old. Most people are content to rear species that occur in their immediate area. The knowledge gained during the rearing of frogs and tadpoles - and the contacts that you make - may well lead you to participate in forums and frog conservation initiatives including monitoring and habitat creation or enhancement.

A message for schools

Approval requirements vary from state to state and are subject to change. For example, in New South Wales the Department of Environment and Conservation allows school classes of licensed schools to collect up to 20 tadpoles from one water body only. When the first two tadpoles turn into young frogs they must all be returned and released at the original site of capture. For updates, please contact DEC or the Frogwatch Helpline. (You will find phone numbers and websites at the end of this brochure.)

Are you permitted to collect and keep spawn or tadpoles?

In NSW (and in several other states), if you intend to keep frogs, tadpoles or spawn in captivity, you must apply for an Amphibian Keepers Licence. The Keepers Licence will allow you to obtain

these from a licensed private keeper who has obtained them legally. You must not take frogs, tadpoles or spawn from the wild. Another source of tadpoles or frogs is the FATS Frog Rescue Service. Tadpoles and frogs that have undergone quarantine may be made available to licensed FATS members to keep - in permanent captivity, NOT for release in the garden. Ring the Frogwatch Helpline for information.

You don't need a licence for tadpoles or frogs that occur naturally in your garden. Many people have established garden frog ponds and have frogs breeding in them (see *FrogFacts* No. 2). In almost all cases, these frogs have colonised the pond naturally from the surrounding areas. Do not move frogs, tadpoles or spawn from the wild to your pond: It is illegal; you could bring in undesirable or unsuitable species or a strain that hybridises with a local strain. Also, frogs have a homing drive and are unlikely to stay. Most importantly, there is a risk that tadpoles or spawn you have collected may be harbouring infectious diseases, which you would introduce into your pond. This has recently become a serious problem in Australia.

Spawn to avoid

If you find frog spawn that has been laid in soil, under rocks or under dead leaf litter or in the entrance of yabbie burrows above the water line, do not touch it. This spawn is probably from species that are threatened and that have special requirements that you will not be able to meet. Please note the appearance of the spawn and let the Frogwatch Helpline know of your find.

Most frog species in NSW breed in spring or summer after good rains. You are much more likely to notice the white floating foam nests of Striped Marsh Frogs, Spotted Grass Frogs or of the various Banjo Frogs, but you may also spot the submerged jelly-like spawn of many of the other species. All of these are suitable to collect a sample from, with two exceptions:

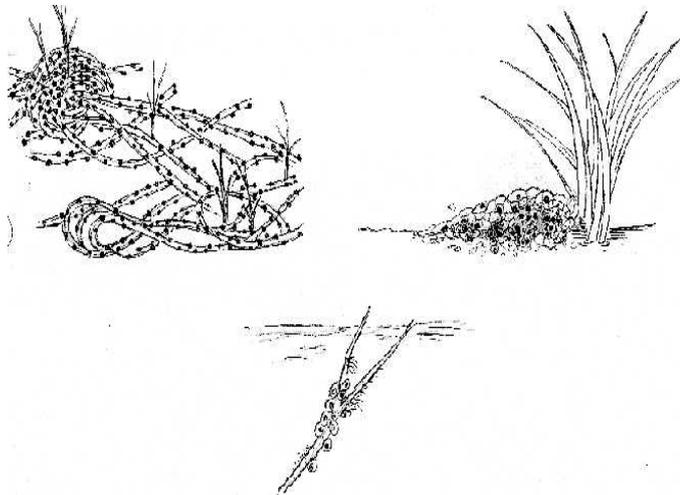
- If you know or suspect that the spawn is that of a threatened frog species, or if you are in a National Park or other reserve, leave it alone.
- If you find Cane Toad spawn (very long gelatinous strands), you should remove it and leave it to dry. Should you find it outside a known Cane Toad area, please notify NPWS or the Frogwatch Helpline.

Tadpoles to avoid

Tadpoles look too much alike to be identified by most people. A suitable identification guide is 'Tadpoles of South-eastern Australia' (details at the end of this brochure). If you raise your taddies through to baby frogs, you may be able to identify the adult frogs from a field guide. This is not as easy as you may think as frogs can change their colours and vary their markings.

There are some groups of aquatic tadpoles to avoid:

- Tadpoles which you know or suspect to be of a threatened frog species, or any tadpoles in a National Park or other reserve.
- Cane Toad tadpoles. These are always small and shiny black with dark undersides and thin tails and often gather in schools. At present they occur as far south as Port Macquarie in NSW.
- If you wish to obtain legally acquired local tadpoles for your garden pond, remember that a few species, such as the Bleating Tree Frog *Litoria dentata*, are particularly noisy and may cause problems with your neighbours. This is another reason why it's important to have in your pond only local frogs that have colonised it by themselves.



Spawn of the Striped Marsh Frog (*Limnodynastes peronii*, right), Common Eastern Froglet (*Crinia signifera*, below) and Cane Toad (*Bufo marinus*, left).

How to get spawn or tadpoles

For licensed school classes: Spawn or tadpoles from the wild

Take no more than 20 tadpoles or an equivalent amount of spawn. You can tease some eggs from a spawn clump without unduly disturbing the rest. They must all be from the same location.

Aquatic tadpoles can be caught with a dip net and transferred into a plastic jar or a strong, watertight plastic bag. It is less stressful for tadpoles if they are not lifted out of the water but scooped out of the

net with a plastic cup. Water provides buoyancy for the tadpole and prevents body organs being compressed. (Stressed tadpoles may take a while to recover and to resume normal growth.) For tadpoles, include some substrate (or "detritus" or "muck") from the pond and ensure that the container holds half water and half air, that it is kept in the shade and is transported without much sloshing. Plastic bags can be supported inside a bucket or box, because water movement can damage frog eggs and tadpoles during transport.

Take four other items home with you - all from the same site:

- If possible, at least two litres of water.
- Additional substrate from below the water, but do not include this with eggs.
- If possible, a handful of fine-leaved water plants from below the water surface.
- A note for yourself of the site location, because you will later need to release the animals at the same place.

As soon as you return, put the water that you collected into an aquarium and place the spawn or tadpoles into it. Gradually (over at least 30 minutes) add "conditioned" tap water (see page 3 under "water quality") of similar temperature - a finger test is sufficient - until the water is at least several centimetres deep. Add the detritus and water plants and place the aquarium in a bright place in the classroom but where it will not overheat. Over the next days, add more conditioned water, but no more than one third of the current volume at a time.

If you have no aquarium at this stage, use a polystyrene broccoli box from your greengrocer, or a very large clean plastic bowl.

Spawn and tadpoles from a garden pond

If you wish to prevent young tadpoles from getting eaten by any fish in your pond, you can remove some spawn from the pond, place it into a broccoli box with pond water, and into a semi-shaded position in the garden if in mid-summer. Add water plants and a handful of substrate from the bottom of the pond. Place the broccoli box lid, with large fly-screened cutouts, over the box to exclude mosquitoes and other insects. Feed the tadpoles once they are free-swimming and release them into the pond when they are 15 mm long (which is usually after 2-3 weeks).

While the tadpoles are being held in a container, do a partial water change every week. To do this, punch a few holes through the broccoli box, one third of the height down from the top, loosely stuff some water plants or rolled-up fly-screen into the holes to prevent tadpoles from getting through, and add water so that the excess flows out of the side holes in the container. If your pond has a circulating water pump, you can direct a small part of that water into the broccoli box. The box should then have a hole near the top through which a short fly-screened pipe or hose is silicon-glued, to allow the water to flow back into the pond. Even without a pump, you could stand the box - weighed down with bricks inside - into the pond, at a level where pond water can flow through fly-screened cutouts in the sides of the box. *FrogFacts* No. 3 (Establishing Frog Habitats on Your Property) describes a similar system.

Spawn from the water bowl in a frog cage

Only very few frog species spawn readily in a water bowl in captivity; one of these is the Striped Marsh Frog. After you have observed their spawning behaviour (and perhaps recorded it with a video camera), remove the spawn with most of the water, place it into a larger container and gradually add conditioned water.

Even without filtration or aeration, you will still be able to hatch most of the eggs and raise healthy tadpoles if you:

- Use a water container with a large surface area - for a large spawn clump of 1000+ eggs you need at very least the size of a bathtub.
- Add fast-growing water plants to help keep the water clean. These should be sterilised against the Amphibian Chytrid fungus beforehand (fully submerged for 1 hour in a 1% salt solution and then rinsed is thought to be effective).
- Provide plenty of partial water changes with conditioned water – change one third of the water at a time. Draw the water from near the surface and leave the detritus and tadpole droppings; they browse through them when feeding.

Spawn in a filtered aqua-terrarium

If you have captive frogs in a reasonably large tank that is suitable for your species (perhaps with rain bar, circulating water, biological filtration and temperature control), your frogs are more likely to breed than otherwise. The White-lipped Tree Frog (*Litoria infrafrenata*) and the Green Tree Frog (*Litoria caerulea*) are two species that breed under those conditions.

You may need to ensure that the spawn does not get sucked into the circulating pump. Put most of the eggs with some of the water into a separate tank, so the adult frogs cannot eat the tadpoles or the young froglets. Gradually raise the water level by adding conditioned water, to give the emerging tadpoles as much water volume as possible. Young froglets must be able to crawl out of water by themselves (they are developing lungs and so they can drown). Before the first tadpoles turn into frogs, make sure that the land area has plenty of hiding places and that it can be easily reached, especially by frogs that are poor climbers.

Tadpoles from a breeder or your local frog society

Local frog groups may sometimes be able to provide you with tadpoles or put you in touch with a licensed breeder. These tadpoles (and the frogs that develop) must not be released into backyard ponds or the wild because of the risk of disease. It is often difficult to tell whether tadpoles are infected. Do not make the mistake of releasing tadpoles or frogs in this manner as it may have disastrous consequences for wild frogs. Frogs that you have grown in captivity need to be kept permanently in captivity.

Quarantine

Little is known at present about effectively quarantining and disinfecting tadpoles, although there is a great need for it. Widespread frog deaths are occurring because of the Amphibian Chytrid fungus now present in Australia. Tadpoles can be carriers of Chytrid fungus, even if they look healthy. If you can, transport and hatch the spawn in water to which an aquarium fish fungicide has been added. Methylene blue - or a mixture of methylene blue, malachite green and acriflavine (marketed as Alive-O Aqua-Remedy) - may be effective. Half the dosages recommended for fish on the label of these products have shown no ill effects of several species treated.

More quarantine recommendations are in *FrogFacts* No. 8.

Water quality

FrogFacts No. 10 will discuss water quality, and here only the most urgent basics are presented.

Conditioning water

Tap water contains chloramine (mostly in metropolitan areas) or chlorine. This must be removed because it kills small tadpoles and damages larger ones. Chloramine cannot be removed by letting water stand in the open for a day or two. The easiest and most effective solution is to add water conditioner (from aquarium shops, but check that it removes chloramine as well as chlorine). Tap water that was under pressure in the pipe system may at first still hold

supersaturated gases. They won't harm tadpoles if you never change more than one third of their water at a time - which is also good practice for other reasons.

Waste products

In a bare tank, waste matter builds up that releases substances that are poisonous to tadpoles. Remedies include:

- Adding fast-growing water plants, provided the tank is well-lit and provided the plants were first disinfected (one hour in 1% salt solution).
- An aquarium with biological filtration, such as an under-gravel filter with a circulating pump. The aquarium and gravel should first be disinfected. Beneficial nitrification bacteria must then be introduced, either from a bottle from pet shops (approx. \$18) or by adding a spoonful of garden soil that was thoroughly dried at room temperature (which kills any Chytrid fungus spores but not the useful bacteria).
- Weekly partial water changes; less often if you have either: (a) growing plants, (b) biological filtration once it has been established for at least two weeks, or (c) only a few tadpoles.

Factors affecting growth

Tadpole growth depends greatly on the species, but also on temperature, water quality and food availability. It also depends on crowding and in some cases on the presence of other species, both of which can have an inhibiting effect on growth. Once tadpoles are about 35 mm long (including their tails), you should provide at least one litre of water per tadpole.

Room temperature is suitable for most species, but they will grow faster if you use an aquarium heater/thermostat at 24 - 27°C.

Feeding tadpoles

Tadpoles are omnivores to varying degrees. Most of their food intake consists of vegetation, decaying vegetation and the micro-organisms thereon, but they also eat animal matter when available. They are ineffective at controlling mosquito larvae, but they can clear minor algal blooms.

Captive tadpoles are best fed with items that don't pollute the water too much: tropical fish food (very sparingly) and soft boiled or frozen lettuce. Avoid overfeeding; remove any uneaten lettuce by the next day and feed a bit less next time.

Tadpoles in well-planted ponds generally find their own food, and they will also eat some fish food.

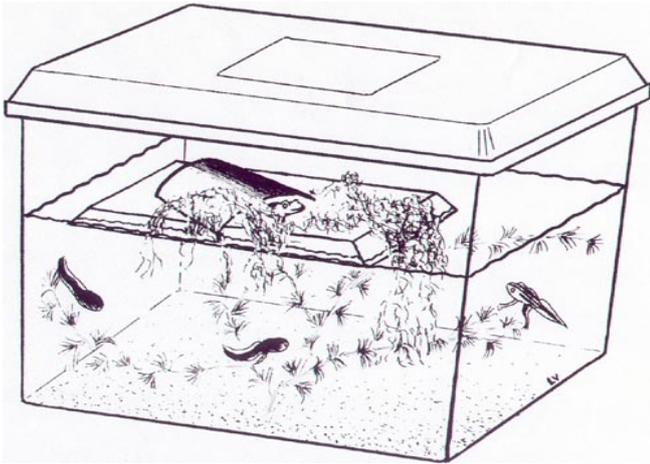
Getting out of the pond

Unless the pond has gently sloping sides at surface level, the young frogs that the tadpoles have turned into may not be able to get out and will drown or starve. See the *FrogFacts* publications on ponds.

Getting out of the aquarium

An aquarium is not only ideal for observing the metamorphosis of tadpoles into frogs, it also helps you determine the right time to remove the young metamorphs individually. The hind legs grow outside the body and emerge first. The arms grow initially inside the body and then pop out. Thereafter (amongst many other changes) the metamorphs will need to breathe air, the tail begins to shrink, and they are likely to drown if they can't get out.

As the first of your tadpoles begin to metamorphose (and they won't all do this during the same week), close up any escape holes in the aquarium lid. Remove daily those metamorphs whose arms have come through, even if they still have a full - or almost full - tail. Place them in very shallow water in a shallow open container in your frog-rearing tank. They will need to eat small, live, moving insects as soon as the tail is fully resorbed.



As tadpoles begin to turn into frogs, provide them with an island in containers with steep sides so they will not drown. The island should contain hiding places. A floating polystyrene island with sloping sides can be covered in Sphagnum Moss or live Java Moss.

Releasing the young frogs

If the spawn or tadpoles came from the wild, remember to release the baby frogs (and any of the tadpoles that have not yet turned into frogs) at the same location. Put the frogs, even if they still have some tail, into a plastic jar or strong lightly inflated plastic bag, with a spoonful of water added. Release the frogs - without their transport water - amongst damp dense greenery at the water's edge.

Releasing tadpoles

It is good practice to release tadpoles without releasing any of the aquarium water as well: Transfer them from their aquarium water into conditioned tap water of the same temperature. Take care that no water plants get into their transport bag. Transport them - again without excessive sloshing - to the correct release site. Equalise the water temperature in their bag, by floating the closed bag in a shaded part of the pond for 15 minutes). Then pour them into a fine-meshed net - at least 10 m away from the pond, rinse the net quickly with pond water and gently drop the tadpoles into the pond. See FF10 for more information.

What you shouldn't release

- Don't release tadpoles or frogs, which you think, might be sick or which have been in contact with sick-looking ones. Ring the Frogwatch Helpline for advice.
- Don't release them if the site has completely dried up and if there is no other suitable place close by. If in doubt, ring the Frogwatch Helpline.
- Don't release non-local frogs into your garden. You could bring serious frog diseases into your suburb, and you could unwittingly change the genetic mix in your area. In any case, frogs are unlikely to stay in a strange garden. In most states they are also protected, and you can't take a frog that you find with you.
- Don't release captive-bred tadpoles in your garden (or anywhere else for that matter) unless there is a good reason and you have special permission. Stick to the species and the local strain that already occurs in your suburb.
- Don't release aquarium water into the wild, into the stormwater system or into the garden. Pour it down the sink or toilet.

Further information

- The postal address of the FATS Group is: P.O. Box 296, Rockdale NSW 2216. When requesting *FrogFacts*, please send a small donation for photocopying and postage.
- FATS Group meetings: Every first Friday of every even month, 7 pm for a 7:30 start, at Newington Armoury, Bldg. 22, northern end of Jamieson St., Homebush Bay. Parking at boom gate.
- FATS Group Web site (with links to other frog groups): www.fats.org.au
- Frogwatch Helpline: 0419 249 728, (02)9599 1161, (02)9371 9129
- Frog Hygiene Protocol and licensing info. on NPWS/DEC web site: www.npws.nsw.gov.au/wildlife/licence/frog.html
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