



ALCOA
FROG
WATCH

a partnership with



Amphibian
Research
Centre



BONKING **in the Garden.**

A guide to making your garden frog friendly

Alcoa Frog Watch

Alcoa Frog Watch is a highly successful community frog conservation program that originated in Western Australia in 1994 with Alcoa World Alumina Australia and the Western Australian Museum. To give Victorians the opportunity to help conserve frog life in their local area, Alcoa has extended Alcoa Frog Watch to Victoria in partnership with the Amphibian Research Centre.

Alcoa Frog Watch aims to involve a large number of Victorians of all ages in actively helping to increase the quality of large-scale frog habitat in Victoria. Helping our frog population also helps bird and insect habitat and gets more people interested in overall conservation of our environment.

Working Together

Urban frog rehabilitation is most effective where local communities work together to build frog habitat at a diversity of scales - from individual frog-friendly gardens through to larger ponds and watercourses designed to offer suitable frog breeding habitats.

Resources for people wanting to build frog-friendly habitat are being provided by Alcoa Frog Watch:

- at the new webpage at www.frogs.org.au;
- at demonstration sites that are being established across Victoria;
- at workshops and training days being held throughout the State; and
- in booklets, publications and the media.

About Alcoa

Alcoa employs 1700 people and has a capital investment of \$2.5 billion in Victoria. Alcoa's Victorian Operations spend \$1.2 million per day through payroll and purchasing of goods and services. In Australia, the aluminium industry is now our second largest export earner. It is Alcoa's policy to operate world wide in a safe, responsible manner that respects the environment. Each Alcoa location is dedicated to conserving the natural environment in which they operate. Our Smelter in the Park at Portland is recognised world wide as a benchmark in industrial and environmental harmony. The Alcoa Landcare Program in Victoria helps farmers to remediate damaged land and funds a range of leading-edge projects to develop and use technology that enhances the Australian landscape. Alcoa is the only mining company on the United Nations Global Roll of Honour for environmental achievement.

About the Author

Gerry Marantelli has devoted his life to the conservation of frogs and is a leading figure in Australian frog conservation. He is a graduate of Zoology at the University of Melbourne and recipient of the coveted CSIRO Medal. Gerry is Co-author of "The Frogwatch Field Guide to Victorian Frogs" and one of the architects of the Frogwatch program. He is founder and President of the Victorian Frog Group and founder and manager of the Amphibian Research Centre (the world's first conservation and research facility specifically for frogs) where he oversees conservation programs for a number of Australia's most endangered frogs. He is universally recognised as Australia's leading expert and a world authority on husbandry and captive breeding of frogs. Gerry is a tireless educator appearing regularly in the popular media on issues relating to conservation science. He has appeared regularly on magazine and educational programs such as "Totally Wild" and runs outreach programs to schools (including frog talks and displays). Gerry regularly presents at scientific conferences and has been interviewed by the respected "60 Minutes", "7.30 Report" and "Quantum" programs and by the prestigious journals "Australasian Science" and "New Scientist". Gerry is the most recognisable frog biologist in Victoria.



About The Amphibian Research Centre

The ARC was established as a centre dedicated to research and conservation of Australia's unique frogs. The ARC is self funding and provides for its valuable work through sales and sponsorships. They supply frogs and tadpoles bred at the ARC, as well as enclosures, food, information, materials and resources required by those wanting to keep pet frogs. School visits and the supply of tadpoles for classrooms assist our work while educating and encouraging responsible attitudes towards wildlife. The Centre is also involved in efforts to breed and preserve a number of Australia's most endangered frogs and is a base for the operations of the Victorian Frog Group.

Photography

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A rose is a rose is a rose... or is it a Frog?

“How do I get frogs in my backyard pond?” is without a doubt the most common enquiry of the hundreds we receive at the Amphibian Research Centre. It is most heartening to see that the current profile of frogs in the media has generated such interest. More important is the fact that most people are genuinely concerned and are prepared to make an effort to provide habitat and to encourage frogs into their gardens. Sadly lacking however, is access to information both on the reasons for creating frog gardens and how to go about it. This short booklet is intended to at least begin to address this problem and to provide people with a launching point from which to dive into their new project...a frog friendly garden.

Before addressing this question it is important to address the question of why people would want to create a frog friendly garden. With few exceptions those I have talked to are concerned about declining amphibians, many miss the contact with frogs that they had as children or wish for a similar contact with frogs for their children. In short it seems that most people are genuinely concerned about frog conservation, and are really asking “how do I best contribute to frog conservation in my own backyard?” This is the question that I have written this booklet to answer.

Where have all the frogs gone?

At this point a few facts about declining amphibians are required. While there is no doubt that urban sprawl and human development have reduced the habitat available to frogs it seems that most declines that are threatening whole species have occurred outside developed areas. Most of the frogs that are currently considered threatened with extinction are unable to be aided in the backyards of urban residents. Many occur in remote areas, some have extremely small distributions, others are montane (mountain dwelling) species or riverine (river dwelling) specialists and some have extraordinary life habits and behaviours that could not possibly be catered for in a garden or even farm habitat.

While very few endangered frogs would be likely to live on a private property there are quite obviously other frogs that do. The more natural the environment, the more likely it is to be home to frogs. A small urban concrete garden is unlikely to have a frog in it while an established garden in an old suburb may provide a home for a number of common species. Several adjoining frog friendly homes may even support an entire population of frogs or provide an extension of habitat for a local parkland. These multi-property habitats or a tract of habitat on a holiday property or farm may even provide sanctuary to a population of endangered frogs.

Common - but for how long?

There is also no guarantee that species which are still common will not become threatened, and the fact that a species is not currently considered to be under threat does not mean that its distribution and abundance has not been considerably altered by human development. There are frog species which are now extinct that were once so common that no-one bothered to study them, instead turning their attention to rarer species. Providing refuge for species in degraded areas is essential if we wish to make sure that they too don't join the ever increasing list of threatened frogs. Much still can and must be done to allow us to coexist with nature, and to allow our local frogs to continue to survive in what was once their natural habitat...our backyards.

Preserving local diversity.

It is a well recognised fact that while conservation efforts may use flagship species to conserve a habitat, the aim of the exercise is to preserve biodiversity. Each habitat that is secured provides refuge not only for its flagship species but for any other plants and animals that inhabit it. The importance of biodiversity extends well beyond the boundaries of a species and while a particular species may not be threatened, its remnant urban populations may represent unique and threatened gene pools. This biodiversity may be lost if we fail to provide safe haven for local frogs. Therefore the answer to the question “How do I best contribute to frog conservation in my backyard?” is simple – to provide areas in which local species may continue to survive.



Legislation.

It is encouraging to see that most states in Australia have protection for some or all of their frogs. Most Australians will therefore be prohibited by legislation from collecting or moving frogs or tadpoles. This legislation exists to help protect frogs but even where frogs are not protected by law it is not advisable to move them or their tadpoles as the consequences of doing so may be damaging to local gene pools.

Above all do no harm.

Understanding nature is never easy and it is always important to consider our actions and their consequences before we begin. I once visited a terrace in inner Melbourne and found tadpoles in their courtyard pond. My surprise at finding a frog not previously recorded in the state of Victoria was addressed with the explanation that they had collected tadpoles from their holiday trip to coastal N.S.W. With all the best intentions they had moved these tadpoles without realising that they may have been moving them outside of their natural range.

A hop too far.

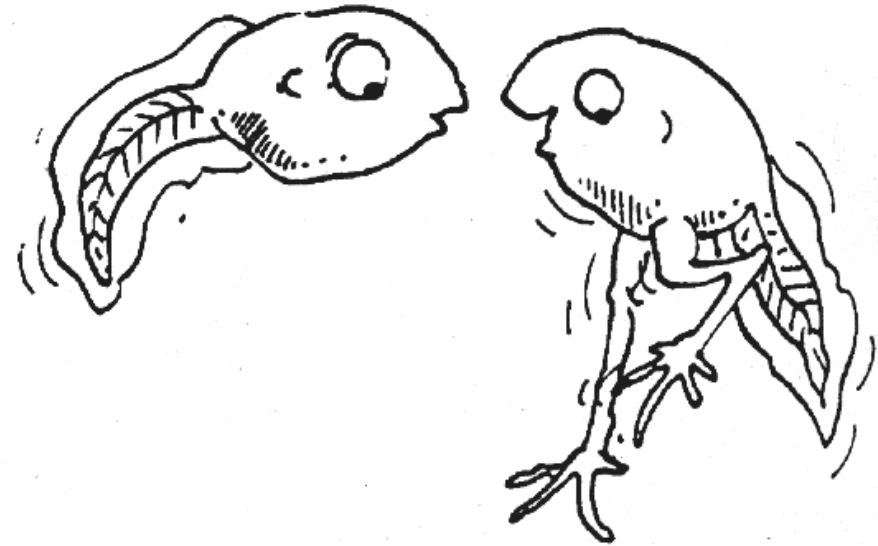
This may seem a fairly extreme example, but for some species a few kilometres may be too far to be moved. One Western Australian frog has a total distribution of just 6.3 square kilometres - even a few hundred metres could take this frog a long way from home. Many species also have specific requirements and may only occur at certain sites within their distribution. The broad shaded areas found on distribution maps can be deceiving as they are usually formed by shading all the area between points at which that species of frog has been found.

A particular species may require a certain soil or vegetation type and despite being distributed across a large area, will only occur at sites within that area where these resources are available. Our understanding of factors affecting the distributions of many frogs is poorly known. Some species may occur predominantly along creeks and rivers or only in boggy areas or even only above a certain altitude. A single farm property may have numerous species occupying all kinds of habitat: one species that lives in the creek at the back; a couple that only occur in the dams; one that is only found in an older dam near a treed area; another that breeds in the roadside ditches; and yet another that can be found in all of these habitats but which occurs in varying numbers and at different times of year in each! Visit your local wetland and you may be surprised to find different frog calls coming from different areas - even within a single large wetland there may be a patchwork of frog distribution.

And if this isn't complicated enough, beyond the distribution of a species is the distribution within a species of unique genetic stock, and our understanding of this is even more limited. The safest action is to err on the side of caution and not to move frogs or tadpoles but rather to provide appropriate habitat and wait for your local frogs to move in.

Should I help tadpoles along?

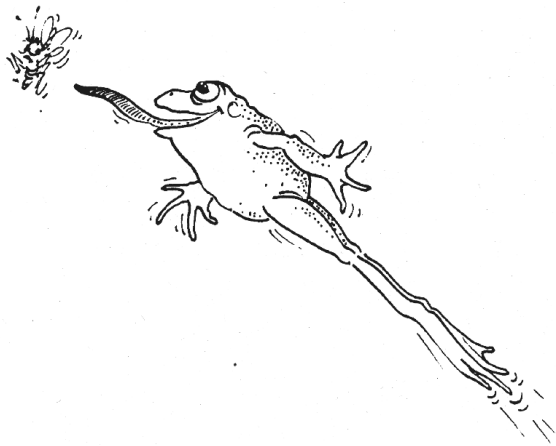
On the topic of frog conservation, there is perhaps one more issue that warrants discussion. While collecting a few tadpoles to be raised for educational purposes and then released may not pose any threat to conservation, there are potential problems with large scale raising of frogs for release even if they are not being moved to a new area. (Note also that this is against the law in some states). There are a number of ways in which this practise can be harmful to local populations.



How does a frog population survive?

A simplified view of a frog population dictates that for the population to remain stable each female must produce an average of two offspring that in turn go on to do the same. A female must replace herself and one other - the male, or composite of males, with which she has spawned. Because of their position on the food chain (or more importantly the position of tadpoles in the food chain) many frogs produce vast quantities of eggs in order to achieve this reproductive goal. An example may place this in context. A female Pobblebonk Frog (*Limnodynastes dumerili*) may produce 5000 eggs a year during a reproductive life of up to 10 years. A conservative estimate places this female's life production at 50,000 eggs! Of these, only two need to survive and reproduce to maintain the population. In other words, very few tadpoles ever survive.

The fact that most tadpoles will not survive provides an enormous selective pressure. Although survival may be severely influenced by environmental factors like drought, and selection may not act on every individual (some will survive by luck) this pressure nevertheless enables the population to evolve and persist over time. Some populations have such low recruitment (the number of young frogs surviving to enter the adult population) during some seasons that huge numbers of recruits are needed during favourable times simply to restore past population levels. Many frog populations fluctuate wildly over time. This is natural and does not mean that when populations are low they will always need our hands on help. In fact most of the frogs that inhabit suburbia and developed rural areas represent species that exploit this "boom or bust" lifestyle.



So what happens if I raise and release tadpoles?

Hypothetically; if we were to collect some frog eggs from the local pond and remove them from natural pressures we can greatly increase their survival. In nature almost all tadpoles of common pond dwelling frogs are eaten - very few die from other causes. Simply placing them in containers that are protected from waterbirds, yabbies, tortoises and predatory insects is enough to ensure most will survive. As more offspring survive, the representation of the parents' genetic heritage increases.

Consider some statistics on reproduction. Each offspring retains 50% of the genes of its parents. If two offspring survive, each retains a random 50%. Statistically the second offspring will include a unique 25% not held by the first. Their total will be 75%. By the time seven offspring survive they will hold over 99% of their parents' genes. Ten offspring will hold 99.9% and fourteen will represent 99.99% of all the genes held by their parents. If we then release these to the pond our action disadvantages the genes of other frogs whose offspring were left to cope with the natural selective pressures. We have favoured the offspring of a single pair of parents of a single species.

One further point needs to be considered. If we increase the survival of offspring of one set of parents we dilute the diversity in the local gene pool. The following example illustrates this fact: Remove an egg-mass from a pond that is home to a stable population of 100 frogs of a single species. This year the pond dries up and no tadpoles survive. We then release our successful batch of frogs to the area. How has this affected diversity? We have swamped the local environment with related animals and even if we release only 10 frogs we have reduced genetic diversity to 90.9% of what it was. If we release 50 it reduces to 66.6% and 200 released frogs produces a reduction to 33.3%.

Many other factors must be taken into account. Our actions may not affect all populations in the same way. In most cases a particular habitat will be home to a number of species and we will unknowingly favour one species over another on the basis that its eggs or tadpoles are either more obvious or more plentiful. We are in fact likely to advantage a common or more visible species to the detriment of a rare or more cryptic species. The misdirected efforts of some well meaning frog garden enthusiasts in Sydney is thought to have contributed to the growing numbers of Striped Marsh Frogs (*Limnodynastes peroni*) - now extremely common in suburban ponds. Recent evidence has also suggested that the presence of tadpoles of this species reduces the survival of tadpoles of the endangered Green and Golden Bell Frog (*Litoria aurea*) another inhabitant of urban Sydney. It soon becomes apparent, despite these somewhat contrived examples, that moving or raising and re-releasing frogs even in relatively small numbers may actually do more harm than good.

It's a small world.

Conservation is seldom easy and a backyard is usually small. But the first step to conserving our planet's resources is a small one, "think globally and act locally". We are not trying to create a rose garden; we can't simply just plant the frogs (or tadpoles) and wait for them to grow. What we are trying to do is to foster the plants and animals that belong in our area and by doing this, preserve local genetic diversity. If we cannot achieve this then we may as well plant a rose garden. It may be nice to "plant" frogs in your garden, but if you do it will be no more than that, nice, but they may as well be roses!

So how do I make my garden frog friendly?

When setting out to reclaim habitat for local frogs there are a few things that you need to consider. You will need to investigate what frog species occur in your area and what types of habitat they require to establish and survive in the long term. Our website www.frogs.org.au should help you determine this. Try to keep in mind that the maps will oversimplify the distributions of frogs as mentioned previously. It is preferable to make your own investigations to determine the occurrence and requirements of local species.

A frog friendly garden without a pond!

Australia is home to over 200 species of frogs. Their diversity in form and behaviour is remarkable and their habitat requirements are equally as diverse. Some require permanent water, some prefer temporary pools, others require streams and rivers and quite a few can reproduce in the absence of waterbodies! As mentioned earlier it is not usually possible to provide refuge for the more unusual species in suburbia. Thankfully it seems that many of these specialist frogs never occurred in the areas now occupied by cities or it is likely they would have disappeared. It is however possible to provide habitat for a wide range of frog species even on relatively small properties. I once had a frog brought to me that was found in the garden of a terrace house in inner Melbourne that had a total garden area of only five square metres! Further investigation suggested that the breeding grounds were at a local park some 200 metres away and it is likely that this frog was just using local gardens as a place to shelter and hunt for insects during the non-breeding season.

Are there any frogs in my garden?

However big or small, your garden may already be home to frogs! It is often with some surprise that people contact me to inform of a frog found in their garden. "But we don't have any frogs in the garden!" is a phrase I commonly encounter. What is often the case is that they do have frogs frequenting their gardens but in the absence of breeding sites the frogs breed nearby. Most frogs need wetlands to breed but they usually spend most of the year elsewhere. If they all spent all year in their breeding habitat the population would have to be smaller and less robust. There are not always enough resources around a breeding site to support a population throughout the year and since many frogs are seasonal or opportunistic in their breeding they may move into other habitats during the non-breeding season. By taking advantage of other habitats, frogs increase the size and durability of their populations. A good frog population therefore needs access to a lot more "elsewhere" than breeding habitat. The male's advertisement call (which is most commonly produced for the purpose of attracting a female) is the most recognisable sign of the presence of frogs. Many people don't realise that there are frogs in their gardens because they don't hear them. The provision of a breeding site will help to keep frogs in your garden and to assist in sustaining the local population.

Looking for frogs.

Visit www.frogs.org.au to determine the time of year at which frogs will most likely be breeding in your area. The best time to go looking for frogs is at night, usually just after dusk and preferably shortly after it has rained. Most frogs prefer a warm day with a late change to showers or even thunderstorms. If you plan your search during this type of weather you will greatly increase your chances of finding frogs. Make sure you are familiar with the local ponds, creeks and ditches that may contain water after rain. These are the most likely places to find frogs in urban areas. Take a drive during the day and mark down likely sites on a map - it is remarkable how hard it is to find that flooded ditch you knew was there, after dark. The keys and recordings at www.frogs.org.au will assist you in identifying any frogs that you see or hear. Being certain of your identification is not critical as it is the habitat of your local frogs, whatever species they may be, that you are trying to recreate.

Rebuilding a habitat, some DOs and DON'Ts.

Once you have looked at a few frog habitats in your area you should be able to determine which frog species occur nearest your property and which habitat types you could reasonably recreate or may have existed historically on your property. Check www.frogs.org.au for the breeding times of the species you have found in your area. The chances of frogs colonising your garden are greatest if the breeding site is ready prior to the breeding season. Take care also when modifying existing frog breeding habitats that you do this outside of the breeding and tadpole season to minimise disturbance to frogs that are already using the site.

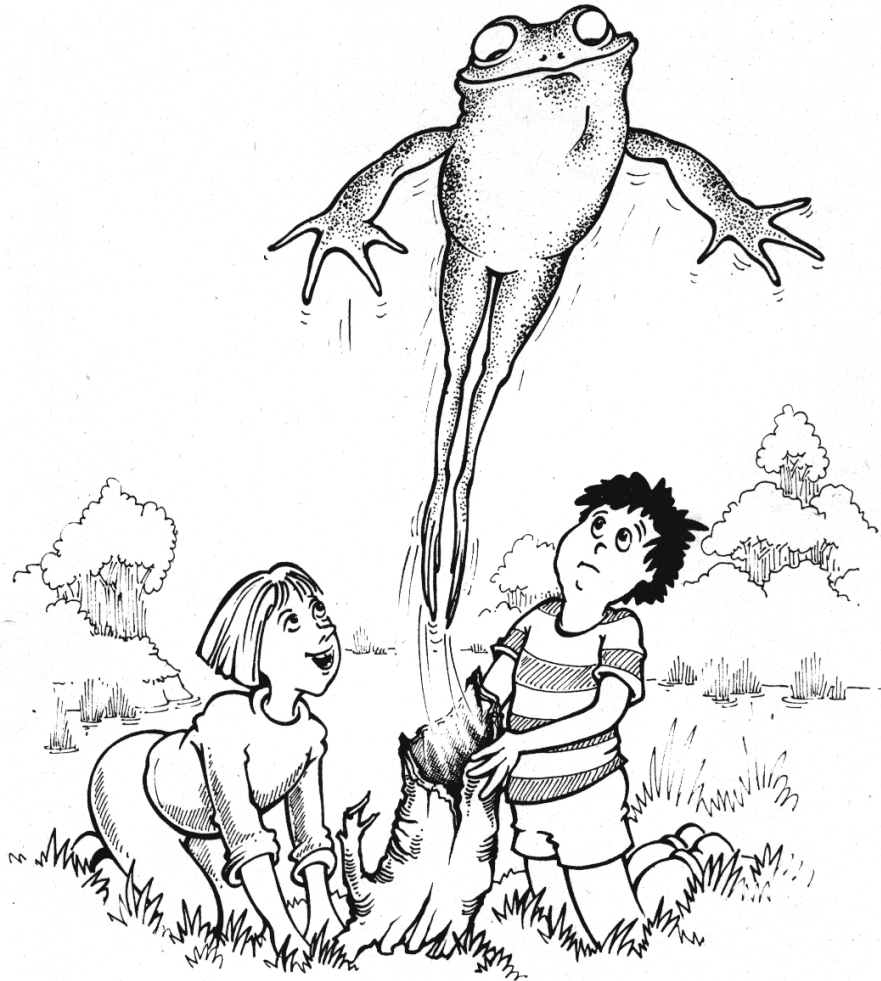
Plants for a frog friendly garden.

Try to use local plants where possible as this helps to conserve local gene pools. There are many plant nurseries that now deal specifically in indigenous plants grown from local seed stock. Check with the local conservation societies or nurseries for the location of your nearest indigenous nursery. Greening Australia also has locality maps for indigenous nurseries for many areas. This list of indigenous nurseries will assist those in Melbourne.

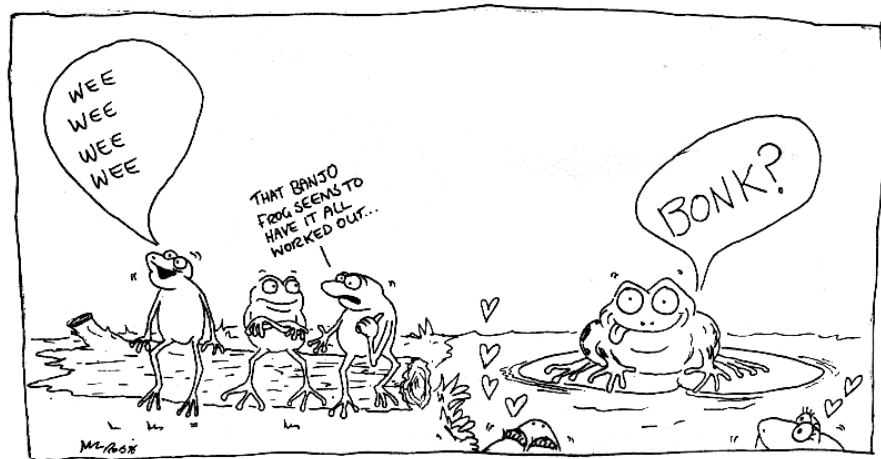
Now that you have decided on the type of habitat that you wish to recreate, there are a few things that hold true in any frog friendly garden. If you are creating a water body it is best to use an area that is at least partially shaded. This will help to keep some of the land areas moist year round while also providing areas of warmer and cooler water allowing tadpoles to seek their preferred temperatures. It is also necessary to allow access to light, as this will encourage growth of algae and other plants that provide part of the tadpole diet. Do not place ponds under trees that have toxic leaves that may be shed into the water. Some gardening books and most good nurseries will be able to tell you if any of the species in your garden are toxic.

Designing a pond.

With most water bodies it is best to provide extensive shallow areas. These are the areas preferred by many of the semi-aquatic or bog plants. Many frog species use these areas for calling and depositing eggs. It is best to provide heavy vegetation around at least part of any water body. These heavily planted shallows also provide refuge for tadpoles from fish and water birds and allow tadpoles to bask in the sunlight to increase their body temperature and speed their development. Steep or vertical walls should be avoided, it is best for the banks to slope gently and allow a smooth gradation for small frogs to escape. Many frog species will easily drown in swimming pools and steep sided ponds.



Avoid using floating plants like duckweed (*Lemna.*) and water fern (*Azolla*) these will quickly encrust the water surface and deprive tadpoles of oxygen. They will also block out the light which is needed to allow the algal growth discussed earlier. Always provide shelter for the adult frogs as well. Most would be catered for by providing rocks, leaf litter, shrubs, tussocks, thick ground hugging plants and logs (including hollow ones and some with loose bark). These can be decorative as well as functional. The moist substrate beneath logs and rocks may be a valuable shelter for frogs during dry periods. Place a good portion of such sites in moist shaded areas. Remember, some frogs move around quite a lot so these shelters do not all need to be near the water. One breeding site may support a population of frogs that will inhabit several gardens! Encourage your neighbours to provide habitat even if they are not willing to create a breeding site or pond.



Things that go "bonk" in the night.

Be conscious of where you place a potential breeding site. Not only are you inviting frogs to take up residence in your garden but also to breed. The prelude to breeding (the males' calling) can be noisy. The sound of frogs is to some a pleasure, but not everyone will understand. If it is not practical to have frogs calling in your garden try to encourage re-vegetation programs and efforts to restore local wetlands to their original form. This will provide valuable habitat for many local species that may still quietly use your garden. Your local school may even like to create some frog-breeding habitat. There's a good chance no-one will be disturbed by the sounds of frogs in the night at a schoolyard.

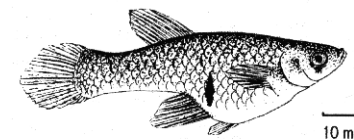
Permanent or temporary waterbodies?

Many of the frogs that will survive in urban areas prefer to breed in temporary water bodies. This is one of the reasons they are most active after rain, it's the best time to find a flooded ditch or depression. When an area floods the plants on the bottom begin to die and decompose. This provides food for fungi and bacteria that colonise this dead material and aid in its decomposition. This in turn provides lots of food for tadpoles which eat the decomposing material, the fungi, and the bacteria. Tadpoles have simple guts and fungi and bacteria are much easier to digest than plants. In a more permanent pond leaves from surrounding trees and emergent vegetation will fall into the water and decompose providing food for your tadpoles.

Can I have fish?

Frogs and tadpoles that inhabit these types of temporary habitats do not usually have very well developed defences against fish. Frogs in tropical climates, and frogs whose tadpoles inhabit rivers where fish are more abundant, seem to have better developed defences than their southern swamp dwelling relatives. If possible do not put fish in your pond! In the far north of Australia it may be necessary to have some fish to control mosquitoes that spread diseases like Ross River virus. Throughout much of the tropical north the frogs have some resistance to fish so it is not such a problem. Use only small native fish (these are best at mosquito control anyway) and adhere to the same local conservation principles as for frogs. Since fish can rarely colonise landlocked water it may be necessary to introduce a small number from a nearby pond. The best fish to use are Blue-eyes and Rainbow fish - both are small and will generally only eat very small tadpoles. Move the fish the smallest distance possible, preferably less than one kilometre. By doing this you will be providing habitat for another local species.

Do not release "Mosquito Fish" (*Gambusia affinis*) into any water body! It is illegal to be in possession of this introduced pest species in some parts of Australia (including Victoria) and, although it occurs in many areas in the wild, all efforts should be made to reduce and halt its spread. This fish will eat vast quantities of tadpoles several times its own size by simply ripping pieces off them! This species could easily decimate a backyard frog population.



Gambusia

Animals to avoid!

Cats and foxes should also be kept out of your frog habitat. It is not uncommon to find a cat with several dozen frogs stuffed into its stomach after a rainy evening. Natural predators may also cause a problem to small populations, and animals like waterbirds and turtles cannot usually be supported in the back yard ecosystem. These animals usually require more space and greater food reserves and will eat your pond out in no time.

In Northern Australia the Cane Toad (*Bufo marinus*) may be an unwelcome guest in your garden. Cane Toads often avoid heavily vegetated areas but if they prove to be a problem in your frog habitat they can usually be excluded by placing a wire mesh fence of about 30cm in height around the breeding sites. Consider the size of your local native frogs and try to purchase wire with a hole-diameter that will exclude toads while still allowing unrestricted access to the frogs you are trying to assist. It is only necessary to exclude adult toads and if they are denied access to breeding sites we may ultimately reduce their numbers.

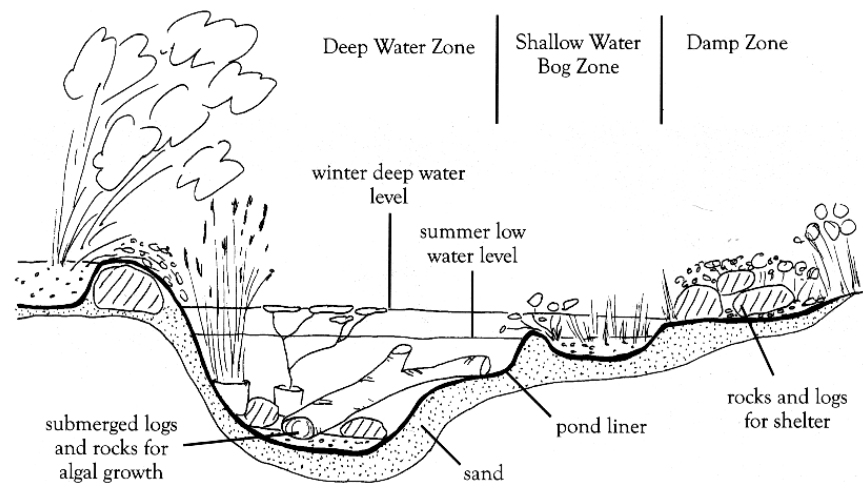
The chemistry of life... or death!

Frogs are sensitive to a number of chemicals. Those most commonly in use around the home are pesticides and herbicides. It is best to avoid the use of pesticides and herbicides where possible. Avoid contamination from polluted run off from stormwater drains or run off from fertilised soils. The increased nutrients in run off from fertilised areas can cause an imbalance in your aquatic ecosystem that may harm the tadpoles or even the frogs. Some plastics including some of those used in pond liners contain chemicals that are toxic to frogs. These chemicals are usually used to protect the plastic from fungal attack and to provide resistance to Ultra Violet (UV) light. Make sure that when buying a liner it is made from plastics approved to hold human drinking (potable) water. Your local rainwater tank supplier may use these liners inside metal water storage tanks. Some pond liner suppliers are now also making these plastics for ponds due to toxicity problems experienced with fish and frogs. Remember that such plastics are not usually UV resistant and may have to be buried completely to avoid damage from sunlight.

Simply avoiding contaminating your little habitat with chemicals is only part of the solution. Your storm water drain will most likely run into the nearest stream or creek. A vast area of frog habitat that could never be replaced in backyards lies awaiting our assistance. Even if you can't find time to get involved in local revegetation along creeks and habitat corridors, you can still avoid polluting them. Don't put paints, oils, petrochemicals, and other nasties down the storm water drain.

Next time you wash the car try doing it on the lawn. You'll get to water and fertilise the grass at the same time as protecting the local stream from pollution.

A frog friendly garden can be an attractive focal point. Its creation can be satisfying and educational and if done right is a positive step towards local and global conservation. With frogs fast overtaking dolphins and whales as the new conservation flagship, every habitat that is saved on their behalf buys time for the myriad of species that sail with us on our fragile ark. We must act now if we are to stem the tide that threatens to engulf us. If the flagship sinks, how much of the ark will be lost with it?



Who's who in the pond?

“Lord of the marsh”

Perhaps the most common inhabitants of urban and farm wetlands are the marsh frogs in the genus *Limnodynastes* which literally translates as “Lord or king of the pond or marsh”. The several species of marsh frogs have varying distributions but there is no place in Victoria not home to at least one of them. *Limnodynastes* includes two groups: the bonking frogs and the marsh frogs.

Bonking frogs



The Pobblebonk or Banjo Frog (*Limnodynastes dumerili* - at left) is by far the best known garden frog in Victoria. Its loud resonant “Bonk” can be heard throughout most of the state. Its close relative the Great Bullfrog (*Limnodynastes interioris*) is much rarer in Victoria but makes a similar call and has similar habits.

Habitat

When breeding: Large ponds or dams provide the best breeding habitat for these species. They prefer permanent water and usually will not breed in shallow ponds. 30cm or more of water is almost essential and deeper, 60cm plus, ponds are favoured.

When not breeding: These frogs burrow and are often found a long way from water. Soft moist friable soils are preferred and they are regularly encountered when people are digging in their gardens. They surface at night especially after rain to forage for insects.

Male calling site: Males call from secluded sites usually amongst vegetation or under overhangs at the pond edge. Large emergent tussocks in 15cm or more of water are among their favorite call sites.

Oviposition (egg or nest) site: Up to 5000 eggs are laid in a foamy white egg mass usually hidden amongst vegetation or under overhangs. Often this is in a “nest” site excavated or pressed out in the vegetation by the male.

Tadpoles: Spend most of their time at the bottom of waterbodies. Shallows are used to bask and speed up development which can take over a year.

Marsh frogs

The sharp “click” or “toc”: of the Spotted Marsh Frog (*Limnodynastes tasmaniensis* - below right) is a familiar sound to many Victorians. Described as either a leaking tap or the tapping of two pieces of wood, males will actually respond to the sound of tapping dry wood. The duller “cluck” of the Striped Marsh Frog (*Limnodynastes peroni* - below left) is often described as similar to the clucking of hens. Both are regular first arrivals at new ponds in urban Melbourne and will often appear quite literally overnight!



Habitat

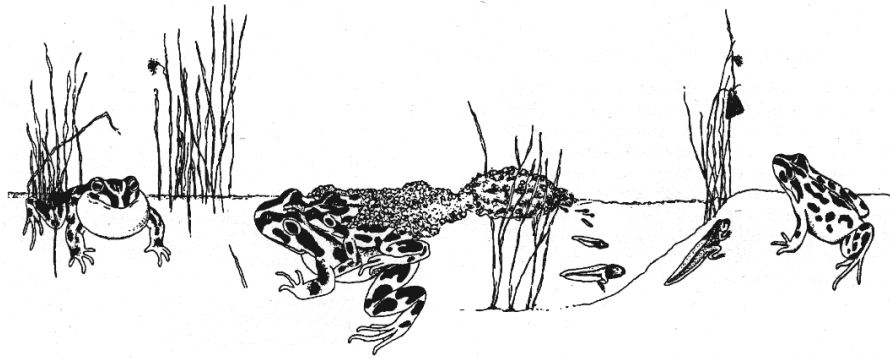
When breeding: Heavily vegetated ponds, wetlands or even flooded paddocks are considered breeding habitat for these frogs. They will regularly populate temporary waterbodies and commonly “appear” as soon as flooding occurs. This quick occupation of newly flooded sites is best exploited by the Spotted Marsh Frog, the Striped Marsh Frog preferring only slightly more permanent waterbodies.

When not breeding: Marsh frogs seldom travel long distances from potential breeding sites, partly because any habitat holds promise for breeding if it floods. They are often found secreted away in soil cracks or under debris, especially large logs and rocks that preserve the soil moisture.

Male calling site: Males call from a variety of sites, usually in shallow areas secluded amongst vegetation but often in just a few centimetres of water and sometimes even out in the open.

Oviposition (egg or nest) site: Foamy white egg masses of about 1000 eggs are laid floating in virtually any position secluded or otherwise.

Tadpoles: Are primarily bottom-dwellers grazing on decomposing materials and algae. Shallows are used to bask. Development can be completed in 2-3 months.



Froglets

Older references refer to the froglets as *Ranidella* which actually means little frog - a very apt description. These frogs have now been placed in the genus *Crinia* and two of the three Victorian species are common inhabitants of ponds and dams. The “ratchet” or “creaky door” call of the Common Froglet (*Crinia signifera* - pictured) is often mistaken for crickets. The “squelch” of the Plains Froglet (*Crinia parinsignifera*) is one of the most common night sounds in rural Northern Victoria.



Habitat

When breeding: Almost any puddle holding more than a few litres of water. The froglets show a preference for ephemeral waterbodies, but will occupy the shallows or less permanent parts of larger more permanent wetlands.

When not breeding: Anywhere that retains any moisture, usually under debris in depressions.

Male calling site: Males usually call from the water surface, floating or resting on semi-submerged materials or the pond bottom in the shallows. At some times males can be found calling on land under vegetation, leaves or in the open at the waters edge.

Oviposition (egg or nest) site: 100-200 single eggs are scattered attached to submerged materials or resting freely on the pond bottom.

Tadpoles: Rummage through debris at the bottom, usually in shallow water. They are often difficult to see and may forage buried amongst loosely piled leaves and vegetation that has died due to flooding.

Southern Tree Frogs

These frogs are the leading offenders in the “tadpoles in my swimming pool” dilemma faced by many Melbourne residents in late spring each year. Being tree frogs these species can easily climb in and out of pools, garden bath tubs and stock watering troughs. The Brown Tree Frog (*Litoria ewingi* - below left) is the most commonly encountered species, while the closely related Whistling Tree Frog (*Litoria verreauxi* - below right) seems to be more restricted in its use of human occupied territory. The familiar sound of these frogs can be described as a purring trill or whistle.

Habitat

When breeding: Semi-permanent and permanent ponds. These frogs show a preference for deep water and regularly take advantage of neglected swimming pools.

When not breeding: Moist areas. In urban areas they are often found in plant pot water trays.

Male calling site: Males usually call from grass stems or small branches overhanging deeper areas of water.

Oviposition (egg or nest) site: 500 or more eggs are deposited in clusters on twigs or grass stems hanging into the water. Clusters are usually positioned a few centimetres below the surface in deep water, but can be laid close to or at the surface in shallow areas if other habitat is unavailable.

Tadpoles: Often bask and feed floating at the surface. They exhibit the characteristic mouth-up 45 degree hanging posture shown by many tree frog tadpoles at the water surface. They can also be seen grazing on algae and other materials at the bottom, usually with their flickering tail tips facing up at 45 degrees.

