

May I touch that frog?

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ABSTRACT

Frogs and tadpoles are no longer commonly encountered. Many modern children cannot share their parents' childhood experiences of watching frogs in a nearby swamp, or collecting tadpoles and watching them transform into young frogs. Declines in frog numbers have resulted in stronger fauna protection laws that place additional restrictions on the interactions between people and frogs. In addition, pollution, the introduction of exotic diseases that affect amphibians and the degradation of frog habitats add new stresses on existing frog populations.

For people to experience frogs, some avenues are still open. In some states, schools are allowed to hold tadpoles for class use, and specialist community groups are authorised to conduct frog-based field trips. Captive-bred frogs may be kept as pets in most states but the taking of frogs from the wild is generally illegal. People may obtain "rescued frogs" as pets but, in most cases, captive-held frogs require the acquisition of a fauna licence. For many people, establishing a frog pond and frog habitat in their backyard is the easiest and most practical way that they can experience frogs.

Key words: frogs, legislation, frog diseases, chytrid, pet frogs, fauna licences, backyard frog ponds.

Tadpoles and Childhood

For many people, especially of older generations, life as a child included playing in nearby bushland and observing animals such as frogs and tadpoles in the wild. Tadpoles, in particular, held great fascination, as they transformed from a fish-like creature into the hopping land animal that is a frog. Collecting and watching frogs and tadpoles was regarded as a "normal" activity for children and adults (White and Burgin 2004). But what experiences are available for today's children? With limited exposure to the natural world, will future generations still be prepared to defend global ecosystems?

Australia in the 21st Century

Over 80% of Australians live in urban or semi-urban areas (Bureau of Statistics 2007); ready access to areas of bushland is not possible for many people. Native animals, such as frogs and tadpoles, are more remote and inaccessible than ever before. Many of our native frogs are in decline and are listed as threatened or endangered (White 1995), special laws have been passed to protect them and all other frogs. In addition, exotic diseases (Daszak *et al.* 2000) and exotic predators (e.g. Pyke and White 2000) have been introduced into this country and that they prey heavily on frogs and tadpoles. Not only are frogs and tadpoles harder to find but there are many more restrictions limiting ways that you can interact with them. For example, what happens if you do have a day in the country and you find a frog or tadpole? Can you pick it up and take it home? Can you watch the miracle of metamorphosis like so many before you?

The Issues

Touching Frogs and the Law

All frogs are protected by law in Australia; there is state and commonwealth legislation in place that covers frogs and frog habitats. For example, in New South Wales frogs are protected under the *National Parks and Wildlife Act 1974*, and many declining species (including threatened frogs) are further protected under the *NSW Threatened Species Conservation Act 1995*. In addition, Commonwealth legislation can also apply; the *Environmental Protection and Biodiversity Conservation Act 1999* protects certain frog species and their habitats. These laws were enacted in response to Australia being a signatory of the convention on Biodiversity. The laws encompass all threatened species of native flora, fauna, and communities that have been listed and as a consequence it is an offence to touch, collect or otherwise interfere with frogs and tadpoles without special licence requirements (e.g. for research or educational purposes). In general, if you encounter a frog in the wild, you are permitted to observe it but you cannot restrict its movements, handle the animal or otherwise interfere with it or its behaviour. As there are differences between states in relation to fauna protection, it is advisable to first contact your state wildlife agency if you intend to interact with native wildlife, especially frogs.

Sensitivity of Frogs to Touch

There are sound reasons why frogs and tadpoles should not be freely collected or handled. Frogs and tadpoles have thin permeable skins that readily absorb water-soluble substances from the surface that they contact (Stebbins and Cohen 1995). Human skin produces oils and organic acids that can harm frogs, in addition, potentially toxic substances (e.g. nicotine, detergents and petro-chemicals)

may be on the persons' skin and these can be unwittingly transferred to the frog (Colborn and Clement 1992). The concentrations of harmful substances that will cause damage or distress to the frogs are often extremely low and may not be detectable by human sense organs.

Frog Diseases

Highly contagious exotic diseases affecting amphibians are now widespread across parts of Australia and these pathogens can be easily transferred between waterbodies, from infected frog to uninfected tadpole, or transmitted by human touch. The best studied of these exotic diseases is chytridiomycosis (chytrid); the pathogen is a tiny parasitic fungus that reproduces by producing numerous tiny, motile zoospores (Berger *et al.* 1999). The spores are most commonly transported in water until they come in contact with a suitable host or carrier. In contact with a host, the spores begin to develop and multiply and the resulting cells that attack the protein keratin in the epidermis of adults and mouthparts of tadpoles. Keratin is a stiffening protein found in the outer integument. Frogs develop a layer of keratin in the basal layer of their skin during metamorphosis to thicken and toughen their skin for life on the land. A chytrid-infected frog rarely shows external symptoms until the last stages of the disease when the skin begins to discolour, tiny lesions begin to appear and death soon follows. Research by Johnson and Speare (2003) indicates that handling infected frogs may not necessarily result in the transmission of chytrid spores, however, it is clear that a cautious approach is advisable.

The potential for the transmission of chytrid and other exotic frog diseases has necessitated a change in activity for researchers and frog enthusiasts. Frogs can no longer be handled indiscriminately, researchers or workers can no longer move from swamp to swamp without taking special precautions. For example, in 2002, the New South Wales National Parks and Wildlife Service (NPWS) developed a hygiene protocol for handling frogs. The protocol was designed to aid frog workers in preventing the accidental spread of disease throughout frog populations. Frog enthusiasts have similarly had to develop special procedures for handling frogs (Figures 1 and 2); the NSW Frog and Tadpole Study Group (FATS) carry out various activities where many frogs may be encountered, such as during field trips or as part of the Frog Rescue Program. In each case, specific hygiene protocols have been developed to complement the NPWS protocols to limit the risk of disease spread. The protocol that is used by FATS for field trips is appended (Appendix 1) to the end of this discussion paper.

Disturbing Frogs through Human Activity

Ongoing studies of frog populations have revealed that frogs can be easily stressed as a result of habitat disturbance or disruption. Where disruption is regular, disease outbreaks are more common and frog populations may be decimated as a result. Disruptions may be extreme and obvious, such as habitat loss due to land clearing, or they may be subtler, such as increased human activity in a wetland during a field outing. One hypothesis that has been proposed to explain these observations is that the immune system of stressed frogs is depressed and the chance of latent diseases becoming expressed in these frogs is enhanced

(Vitt *et al.* 1990). By this means, an otherwise healthy frog population may quickly succumb to diseases that have previously not caused death or impairment. The way that people use frog habitats and behave within frog habitats is an important consideration in the conservation of frogs.



Figure 1. Ken Griffiths disinfecting boots before going into frog habitat areas. Photo, A. White.



Figure 2. Sterile gloves are used when handling frogs, such as this Peron's Tree Frog *Litoria peronii*. Photo, A. White..

Ways to Experience Frogs

While the legislation was intended to protect frogs, it has restricted public access to frogs and tadpoles. However, several avenues remain open:-

1. *Schooluse*: some states have developed special arrangements with schools to enable them to continue to hold tadpoles for a short time in order to allow students to observe the process of metamorphosis in frogs. For example, in NSW, a special licensing agreement exists between the NPWS and the Department of Education that allows classes to hold and observe tadpoles. Each school class is permitted to hold up to 20 tadpoles from an area. The tadpoles are not to be handled, but are fed and allowed to develop until metamorphosis. Before the completion of metamorphosis, the tadpoles must be returned to the site of capture and released. This special licensing scheme was developed to enable schools to let students witness the tadpole to frog transformation, but not to keep the frogs afterwards. The tadpoles are returned to their site of capture during metamorphosis as this is the time when frog deaths can most easily occur as a result of developmental changes, e.g. drowning during the loss of gills and the incomplete formation of functional lungs.
2. *Community groups*: some community groups, such as the Frog and Tadpole Study Group of New South Wales (FATS) and the Victorian Frog Group (VFG) are licensed to conduct frog field trips. Strict frog hygiene protocols apply for these trips (see Appendix 1) and frog handling or disturbance is kept to a minimum, but they are a way that members of the public can experience frogs in the wild without harming the animals that they have come to enjoy.
3. *Frogs as pets*: all states and territories have arrangements whereby frogs can be kept as pets. However, frogs (and tadpoles) cannot be taken from the wild in most states. Pet frogs may be obtained from licensed frog breeders who have long-term captive frogs and who can supply captive-bred frogs as pets. Due to risk of disease transmission, these frogs can never be released into the wild. In some states, Amphibian Keeper Licences are required from the relevant state authority as part of the legal transfer of captive-bred frogs.
4. *Rescued frogs*: frogs (and tadpoles) are often inadvertently transported around the country with produce and many end up in major cities, many kilometres away from their habitat areas. In the past, stowaway animals were destroyed when found but a system has been developed between frog conservation groups and relevant state authorities whereby frogs can be rescued and eventually

made available to licensed carers. As with captive-bred frogs, these animals can never be released back into the wild. In NSW, FATS runs a rescue service where all rescued frogs undergo a two month period of quarantine, during which they are treated for chytridiomycosis (whether they exhibit symptoms or not), and eventually are released from quarantine when it is apparent that the frog is not a vector for this disease.

In NSW, if you find a stowaway frog or an injured frog in the wild, you are permitted to catch the frog and hold it for a short period. You must contact a carer group (e.g. FATS Frog Help Line 0419-249-728, WIRES or Sydney Metropolitan Wildlife Rescue). The frog will be collected from you, taken to a quarantine area and undergo the full course of quarantine and treatment before being made available as a pet animal. If you wish to keep the frog, you will need to get an Amphibian Keeper License and contact the carer group so that you can be notified when the frog is out of quarantine and available for collection. Other states have different arrangement and the relevant wildlife agency should be contacted in advance of obtaining a frog.

5. *Backyard frog pond*: many urban dwellers have discovered that some frogs still occur in our cities. A backyard frog pond will often attract frogs to the backyard where they can forage and perhaps breed. There are several issues that need to be considered before putting in a frog pond (Casey 1996, FATS 2007), not the least being how noisy frogs may affect your neighbours. FATS runs frog pond workshops to inform those of the joys of having a personal frog pond but also highlighting the associated hazards as well. One of the advantages of a backyard pond is that frogs are not captive and therefore the property owner is not obliged to obtain a fauna licence. Other issues, such as the size and nature of the pond, the potential for mosquitoes and water quality need to be considered before setting up a pond. Once established, most frog ponds require little maintenance and are a useful means of extending habitat into your backyard.

If frog ponds are set up correctly, frogs will come to the pond. You cannot collect tadpoles or frogs and move them to your pond as this breaches state fauna laws but is also unlikely to result in the frogs staying in your pond. If your pond provides useful habitats for frogs, they will find your pond and use it; if frogs do not colonise your pond, the pond may not be correctly set up and you should seek advice from frog societies or wildlife authorities. Not all frog species can be established as backyard animals, and in general, there are only between three and five species that are likely to adopt your urban pond (FATS 2007).

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APPENDIX I Appendix I FATS Field Trip Frog Hygiene Protocols

Introduction: FATS undertakes various field trips and excursions into areas where frogs occur. The aim of these excursions is to allow people to appreciate frogs in the wild as well as to permit limited research and observations of frog behaviour and ecology. Because these activities are inherently disruptive, all measures must be taken to minimize the impacts on frogs and frog habitats. One particular impact that is hard to recognize is that of spreading diseases through frog populations.

Two exotic diseases (chytrid and Ranavirus) are now present in New South Wales and both are capable of exterminating local frog populations. Both diseases are highly infectious and easily transported by people (although they don't affect humans). The following precautions must be followed at every FATS field trip. If you are about to undertake an activity that you think may be disruptive to frogs, please consult the field trip co-ordinator who will assess the risk and may invoke additional changes to the field trip protocols.

1. Before you go into a frog area, sterilise your boots and all other equipment that may have come in contact with water. The field trip co-ordinator will have a foot bath with disinfectant available.
2. Do not drive from wetland to wetland. Keep the vehicle out of water if possible. If you have to move between wetland sites, disinfect the underside of the vehicle before moving between areas. The field trip co-ordinator will have spray disinfectant available.
3. When you have arrived at a site, stay together as group. If you spread out you will disturb many animals and may not see the animals that you came to see in the first place. The field trip co-ordinator will explain any hazards associated with each site and where frogs of interest may be found.
4. Do not handle frogs unless it is necessary. Observe them at a distance.
5. If you have to handle frogs, use sterile gloves.
6. One person should be nominated as the frog handler in each group. This person will have a supply of gloves (gloves are to be changed each time a frog is to be picked up).
7. If frogs are being photographed or moved for photographing, the frog handler will do this. The frogs are to be returned to the original location as soon as practicable afterwards.
8. If frogs are placed in plastic bags for transport or holding, the bags cannot be reused to hold other frogs, equipment or for any other materials that could come in contact with other frogs.
9. Any items of equipment that become wet during your stay at a frog site must be considered a potentially infected item and should be disinfected or replaced before going to another site.
10. If you have become wet during the visit to the frog area, you must be considered as a potential source of infection. Clothing, hands, boots etc that have been wet should be disinfected or replaced before going to another site.
11. Do not take frogs or tadpoles from one area to another.
12. Do not collect or move water or soil between frog sites.
13. If you encounter a sick or dead frog, alert the field trip co-ordinator. This frog may be collected and taken back for further study. The field trip co-ordinator will also carry preserving fluids for frog carcasses.