TUSKED FROG

CONSERVATION ACTION STATEMENT

September 2010

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That's why I'm taking action to conserve our wildlife.

BRISBANE CITY
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Tusked frog, *Adelotus brevis*, ©Queensland Museum, Jeff Wright.

1 Introduction[1]

This Conservation Action Statement addresses the tusked frog (*Adelotus brevis*). This species is currently not listed as a significant species within Brisbane, as per Council's Natural Assets Planning Scheme Policy (Brisbane City Council 2000).

Tusked frog (*Adelotus brevis)*

The tusked frog is so called due to the large paired projections ('tusks') that males possess in the lower jaw, used to fend off rival males. The tusked frog is a monotypic genus, meaning that it is the only species in the genus *Adelotus*. Although common in parts of its range, declines and possible extinctions in some areas (e.g. New England Tablelands) prompted its listing as 'Vulnerable' under the Queensland *Nature Conservation Act 1992*.

This Conservation Action Statement will be updated as new information becomes available and to report progress on conservation actions. For more information about this or any other Conservation Action Statement, visit Council's website at **www.brisbane.qld.gov.au** or phone Council on **(07) 3403 8888**.

Aims

This Conservation Action Statement details Council's management intent for long-term protection and conservation of tusked frogs within Brisbane through the following actions.

- Collating **existing information** on the distribution, ecology and management requirements of these species within Brisbane and surrounds.
- Identifying **key threatening processes** that significantly impact upon this species within Brisbane.
- Identifying **gaps in existing knowledge** of the habitat and management requirements of this species and allowing research priorities to be defined.
- Detailing **practical and affordable strategies and actions** that support the long-term protection and conservation of this species within Brisbane.

There are many other biodiversity benefits associated with the conservation of tusked frogs including the following.

- The protection and management of habitat that will also help conserve other threatened flora and fauna.
- Increased information on the ecology, habitat requirements, diseases and other threatening processes that have influenced the distribution and abundance of tusked frogs and that will assist in understanding the declines of other amphibian species.
- The importance of amphibians as indicators of environmental health due to their dependence on both terrestrial and aquatic environments throughout their lifecycle.

In addition to having highly permeable skins, amphibians are extremely susceptible to environmental changes (Hines 2002). The conservation of highly susceptible tusked frogs can ultimately result in the conservation of other less and/or equally vulnerable species.

[1] This document follows the nomenclature provided by the Commonwealth Department of Water, Heritage and the Arts' online 'Australian Faunal Directory' (DEWHA 2010), which is kept up to date with taxonomic revisions and provides a single, categorical point of reference for common names and scientific names for all Australian taxa.

2 Conservation status

The conservation status of a species will influence how it is managed. 'Threatened' species are typically accorded a more stringent management regime than 'common' species. Various conservation registers identify the status of fauna species at local, regional, state and national levels. The current conservation status of the tusked frog is provided in Table 1.

Table 1: Official conservation status of Brisbane's tusked frog

Species	Brisbane City[1]	South East Queensland[2]	Queensland[3]	National[4]
Tusked frog	Not listed	Regionally-significant priority taxa	Vulnerable	Not listed

[1] Brisbane City Council 2000, *Brisbane City Plan 2000*, Natural Assets Planning Scheme Policy, vol. 2 [2] Significant for South East Queensland Bioregion under Biodiversity Assessment and Mapping Methodology (Environmental Protection Agency 2002) [3] Queensland *Nature Conservation (Wildlife) Regulation 2006* under the *Nature Conservation Act 1992* [4] *Environment Protection and Biodiversity Conservation Act 1999*

3 Distribution[2]

National/state

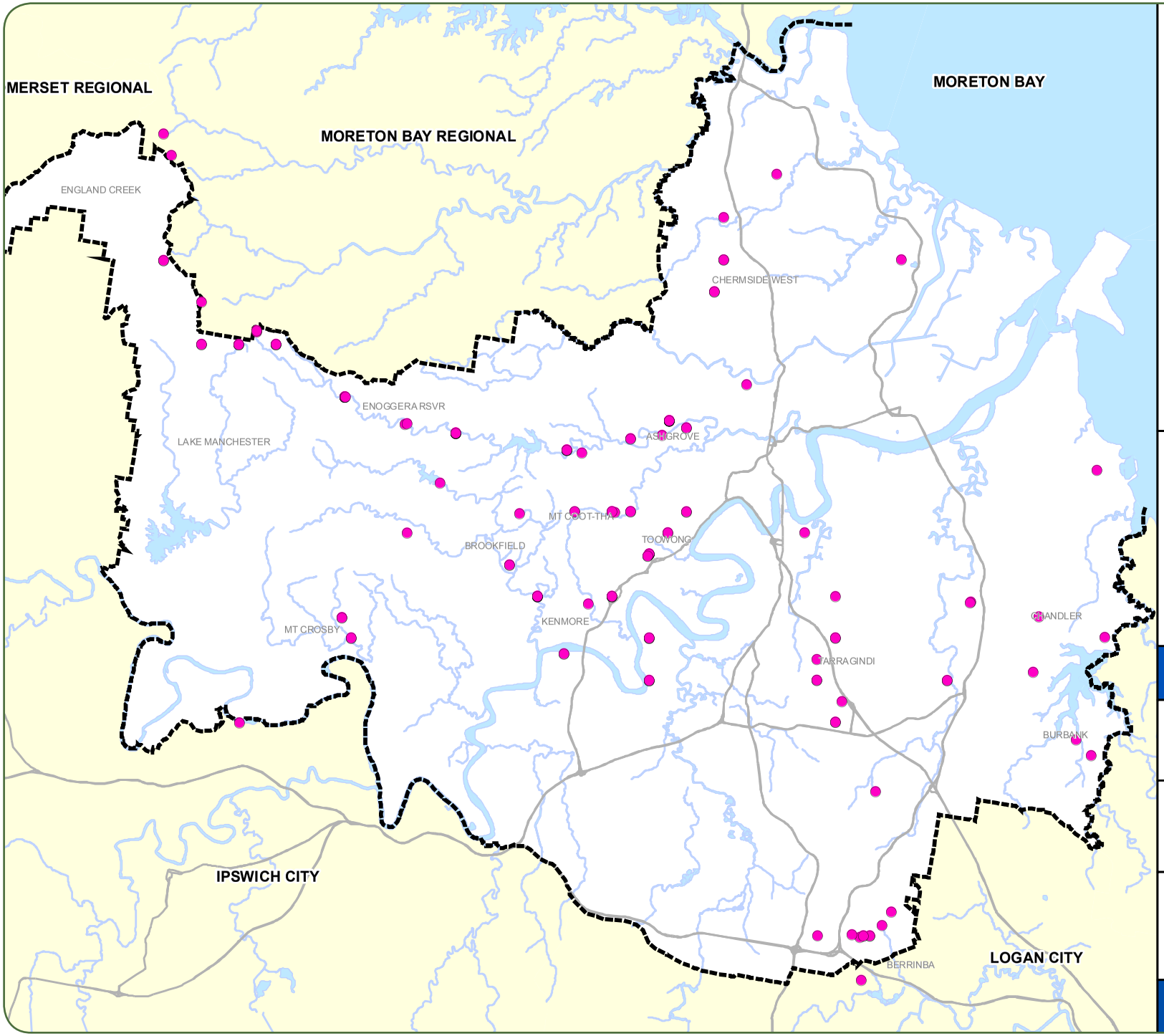
- Occurs from approximately Eungella, Queensland, along the coast and Great Dividing Range to Moss Vale in New South Wales.
- Have also been recorded inland at Blackdown Tableland and Carnarvon Gorge.
- Historically, this species was common on the western slopes of the Great Dividing Range, however its numbers have declined in many areas including the New England Tableland, western flowing streams of the Main Range, elevated sites in the Clarke Range and from the Lockyer Valley in South East Queensland (Ingram and McDonald 1993; Eyre 1997; Gillespie and Hines 1999).

Local

- Mainly concentrated in the western or southern areas of Brisbane.
- Recorded in the suburbs of Algester, Auchenflower, Bardon, Carindale, Chandler, Corinda, Eight Mile Plains, Graceville, Herston, Holland Park West, Karawatha, Kenmore, Mansfield, Mt Coot-tha, Spring Hill, Toowong and Upper Brookfield.
- Also recorded in Ashgrove in summer 2005 (Queensland Frog Society 2005).
- Only recorded in 25% of 119 suburbs surveyed in the Brisbane area, including some inner suburbs (Frost and Morgan 1999).

Verified tusked frog records for Brisbane are shown on Map 1.

[2] Unless otherwise stated, the information in this section is compiled from BAAM (2005).



Tusked frogs

Tusked frog

DATA INFORMATION

N

Brisbane City Council Information
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For more information visit www.brisbane.qld.gov.au or call (07) 3403 8888

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Kilometers

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Publication Date : 11 August 2009
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Projection : Map Grid of Australia, Zone 56
Horizontal Datum : Geocentric Datum of Australia 1994

Conservation Action Statement

Records of tusked frogs in Brisbane

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4 Ecology

Habitat

There has been limited research conducted into the ecological requirements of tusked frogs. However it is understood that broad forest type may not significantly influence the suitability of habitat for the tusked frog as the distribution of this species is often strongly influenced by characteristics of the ground layer e.g. leaf litter, woody debris, shrub layer and soil properties (Parris and McCarthy 1999; Chambers *et al*. 2006).

- Inhabits a variety of habitats including rainforest, wet sclerophyll, dry sclerophyll, woodland, vine forest and can even be found in open grazing country (Eyre 1997).
- Can be found in slow moving streams (or sections of slow moving water in free flowing streams) and dams, particularly around areas where there is a build up of debris such as leaves and sticks.
- On land they can be found under logs and in hollows/rock crevices beside streams and ponds (Meyer *et al*. 2001).
- Small streams may not provide suitable breeding habitat as their extended larval period means these streams may dry out before metamorphosis occurs (Parris 2004).
- Once common in Brisbane and were often found in garden ponds, even in concrete drains of shopping centres, they have appeared to decline since the late 1970s.
- Still present in the city where they appear to be capable of surviving and breeding in some highly disturbed areas and polluted drainage lines e.g. Mott Creek, Greenslopes.
- Does not occur at all sites containing suitable habitat, indicating that precise habitat requirements for this species may still be uncertain.

Diet

- Arthropods are the most important prey type, with beetles being the largest group consumed followed by bugs (Katsikaros and Shine 1997).
- Sexual differences in diets has been observed (Katsikaros and Shine 1997).
- Males consume more molluscs and tend to eat a broader taxonomic range of prey items than females.
- Females spend most of the time feeding in dryer microhabitats where arthropods are likely to be more abundant.
- Males forage in muddy substrates close to waters edge where molluscs are more numerous (Katsikaros and Shine 1997).

Reproduction

- Medium sized species (males 34-50mm; females 29-38mm) that breeds in ponds and streams.
- Males call from a variety of locations within or in close proximity to water, including under rocks, logs and other debris, within dense vegetation as well as from within shallow burrows.
- Most calling sites are close to the surface of the water (Saunders 2002).
- Males construct nests in concealed sites under leaf litter, vegetation or logs in shallow water at the edge of ponds or stream pools (Anstis 2002).
- Breeding usually occurs during the warmer months between September and April.
- The mating system of the tusked frog involves aggressive behaviour between males. Males occupy specific calling sites and will change from giving an advertisement call to giving a territorial call if another male comes near (Katsikaros and Shine 1997).

[3] Unless otherwise stated, the information in this section is compiled from BAAM (2005).

4 Ecology continued...

Reproduction continued...

- Large males experience higher reproductive success because they exclude smaller males from calling sites, obtain more matings, and may father more offspring because they attract larger females (Katsikaros and Shine 1997).
- Eggs are laid in a floating foam mass, 8-12cm in diameter.
- Average number of eggs per mass is approximately 350.
- Minimal larval span for tadpoles raised in captivity is 50 days (Anstis 2002).

Table 2: Breeding seasons (green shading indicates breeding months)

Species	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Tusked frog												

Movement patterns

- There is no detailed information regarding the dispersal and movement patterns displayed by individuals of this species.
- Tusked frogs need to seek protection from desiccation during prolonged dry spells or when shallow water bodies dry up. Movement into the terrestrial environment could be extensive, depending on the availability of suitable refuge sites, especially for females.

5 Threats[4]

As with most amphibian species, there is no clearly identifiable cause of decline of populations of tusked frogs, although several factors are implicated. It is well known, however, that amphibians are extremely susceptible to environmental changes due to their dependence on both terrestrial and aquatic environments throughout their lifecycle, in addition to having highly permeable skins. As such, amphibians are important indicators of environmental health.

Habitat loss, fragmentation and simplification

- Since European settlement, an estimated 67,000 hectares, or two-thirds of the original woody vegetation in Brisbane City, has been cleared. This includes approximately 90% of lowland forests and more than 80% of all lowland vegetation (below 100 metres elevation). Habitat fragmentation is extensive; around 80% of the bushland remnants in the city are less than 20 hectares (Council 2001).
- Habitat loss reduces amphibian abundance and diversity. Draining wetlands directly affects frog populations by removing breeding sites and by fragmenting populations (Semlitsch 1998).
- Habitat fragmentation has also been identified as an important factor in frog declines as it creates barriers for dispersal of juveniles. This may increase the risk of local extinction for small isolated populations because migrating individuals will not be able to successfully integrate into these populations.
- Fragmentation of habitat by roadways can have deleterious effects on frog populations either directly (frogs being run over by vehicles while trying to cross the road), or indirectly through pollution by run-off from roads spoiling waterways, or populations becoming genetically isolated.

[4] Unless otherwise stated, the information in this section is compiled from BAAM (2005).

5 Threats continued...

Habitat degradation and modification

- Loss and degradation of habitat through agriculture and urban development is cited as the major threat to tusked frogs (Hines *et al.* 2004). However, it should be noted that the species can occur within degraded and polluted streams within Brisbane, but the viability of these populations is unknown.
- Other disturbances that are likely to impact this species include:
  - development of adjacent lands causing acid sulphate soils to pollute catchments
  - agricultural and urban land uses causing degradation of waterways
  - changes in water flow regimes and physical/chemical properties of the water
  - loss and degradation of riparian habitat by domestic stock and weed invasion
  - fragmentation of habitat that prevents dispersal of juvenile frogs from natal breeding ponds.
- Previous research into habitat requirements of amphibian species has shown that restoration and protection of aquatic breeding areas may be of little value if adjacent terrestrial habitat used by frogs for food and shelter is of inadequate amount or unsuitable quality (Semlitsch 1998).

Predation, competition and invasive species

- Invasive species prey on eggs and larvae of frogs. They can also cause tadpole fin damage, resulting in increased risks for the tadpoles of disease and predation by other species and reduced growth rates resulting in reduced post-metamorphic fitness (Gillespie and Hero 1999).
- Invasive predatory fish such as mosquitofish *(Gambusia holbrooki)* could potentially result in the complete elimination of some species of tadpoles. Mosquitofish are widely distributed in Brisbane's freshwater wetlands and waterways.
- The cane toad *(Rhinella marinus)* can lay up to 35,000 eggs at one time. Direct impacts include predation of native eggs, tadpoles and frogs, or poisoning of native frogs that ingest cane toad eggs or larvae (Crossland and Alford 1998). Indirectly, effects include outcompeting native tadpoles for food resources or depleting oxygen levels in breeding pools. The effects of cane toads on the tusked frog is not known.

Disease

- Globally diseases are now recognised as causing the decline and disappearance of many frog species (Skerratt *et al.* 2007).
- *Batrachochytrium dendrobatidis,* the cause of amphibian *Chytridiomycosis (Chytrid fungus)*, is a potentially fatal skin disease of amphibians and is thought to be responsible for the decline and disappearance of several frog species in South East Queensland (Department of Environment and Heritage 2006). There are records of deaths for tusked frogs from this disease in Queensland (Berger *et al.* 2004). Adult frogs die within weeks of being experimentally infected. Tadpoles often carry the infection in their mouthparts, but otherwise appear and behave normally (Symonds *et al.* 2007). Because of this, licensed collectors or members of the public may unknowingly spread the disease to other environments (Anstis 2002). Temperature is known to have large effects on occurrence of disease, with outbreaks of *Chytrid* fungus in South East Queensland mostly occurring in the winter months (Berger *et al.* 2004).

Climate change

- Climate change is very likely to exacerbate the other threats previously listed here, particularly tusked frog susceptibility to disease and habitat loss.
- Moisture is a crucial resource for amphibian reproduction regardless of reproductive mode. Changes in rainfall patterns as a result of a changing climate could reduce amphibian reproduction or recruitment (ability of tadpoles to become mature adults) (Lips 1999).
- Findings from recent research focusing on upland frogs in Eastern Australia have concluded that frog declines significantly coincided with rising minimum temperatures (Laurence 2008).

6 Conservation

Several Council biodiversity initiatives are contributing to the protection and management of tusked frogs and their habitat across the city. The following are key initiatives.

- Bushland Acquisition program. Through this program more than 2700 hectares of the city's most significant lowland habitats have been purchased and protected to date.
- Wildlife Conservation Partnerships program. More than 600 private properties have established conservation partnerships with Council, covering some 2000 hectares of principally lowland habitat in significant tusked frog habitat areas.
- Conservation Reserve Estate. More than 13,700 hectares of parkland including 7755 hectares of bushland and wetland reserves are managed and protected. This reserve network provides habitat for Brisbane's significant species.
- *Natural Assets Local Law (2003).* Over 61,000 hectares of significant native vegetation is covered by the Natural Assets Local Law.
- *City Plan (2000).* The *City Plan* designates a green space system throughout the city to recognise and protect the contribution of open space areas to ecological functions. The plan's Biodiversity Code and supporting Ecological Assessment Guidelines provide performance criteria and acceptable solutions to protect significant biodiversity values on, or adjacent to, proposed development. *City Plan* also includes statutory schedules of flora and fauna species considered significant in Brisbane. These schedules recognise the conservation significance of species at a citywide and/or regional level.

7 Research[5]

The majority of recent amphibian research has focused on identifying threats that are causing population declines. There is very limited research addressing specific species, such as the tusked frog.

There is no current research being undertaken regarding the distribution and abundance of the species in Brisbane and a search of the literature failed to find any specific studies, past or present, of the effect of habitat modification or exotic species on tusked frog populations.

8 Management intent

Strategies

Council intends to contribute to the long-term conservation of the city's significant tusked frogs through the following.

- Adopting and encouraging innovative voluntary and statutory mechanisms that protect important habitats and movement corridors.
- Securing and long-term protection of important habitat for tusked frogs.
- Ensuring appropriate ecological assessment, reporting and survey procedures are adopted in development, planning and management activities.
- Encouraging land management practices that avoid, or minimise, direct and indirect impacts on frogs and their habitats on both public and private lands.
- Ensuring the timely availability of accurate, adequate and contemporary information for policy, planning and management decisions and actions.
- Facilitating research that targets priority information gaps and contributes positively to the conservation of Brisbane's frogs and their habitats.
- Providing the Brisbane community with appropriate information and opportunities to contribute in a practical way to better understand and protect Brisbane's frogs.

[5] Unless otherwise stated, the information in this section is compiled from BAAM (2005).

8 Management intent continued...

Actions

Table 3 describes priority conservation actions that Council will pursue with its partners to address the stated strategies. These priority actions have been drawn from studies undertaken for Council by recognised frog experts and from consultation with a range of stakeholders. Actions will be undertaken as funds become available through Council's budgetary process. It should be recognised that Council must consider the timing of these actions against other priorities across the whole of the city.

Table 3: Management actions

Management aspect	Action	Timing	Lead agent & key stakeholders*
Habitat protection	Conserve and protect important frog habitat on privately owned land within Brisbane, through Council acquisition of significant habitat (Bushland Acquisition program) and through conservation partnerships with private landholders (Wildlife Conservation Partnerships program).	Ongoing	Council, private landowners
Habitat management	Develop and introduce specific assessment criteria and habitat management guidelines for developments and other potentially harmful activities occurring within or adjacent to known tusked frog habitat.	2011	Council, universities
	Maintain habitat connectivity by ensuring linear infrastructure does not detrimentally impact on habitat connectivity in areas of frog habitat through Council's Wildlife Movement Solutions program.	Ongoing	Council, DTMR
	Develop and implement appropriate habitat rehabilitation protocols that will not negatively impact on local frog populations.	2011	Council, universities, community groups
	Undertake control or eradication of identified harmful or potentially harmful invasive species from known tusked frog habitat.	Ongoing	Council
Research	Undertake habitat mapping across the city for the tusked frog in the Brisbane area and develop associated baseline 'aquatic and terrestrial habitat requirement criteria' to ensure management strategies are directed to the most appropriate sites.	Commence 2010	Council, universities, QM
	Seek collaborative partnerships to undertake research on the potential threats to tusked frog populations, particularly the effects of invasive species, the role of disease in frog decline, degradation of breeding and refuge habitats, movement patterns and the effects of climate change on local tusked frog populations.	Commence 2010	Council, universities, QM
	Undertake research on the effectiveness of wildlife movement solutions (i.e. road culverts).	Ongoing	Council, universities

8 Management intent continued...

Actions continued...

Table 3: Management actions continued

Management aspect	Action	Timing	Lead agent & key stakeholders*
Mosquito control	Continue the current use of specific and ecologically sound products for the control of mosquito larvae in aquatic habitats.	Ongoing	Council
Information management	Develop a central database for the collation of monitoring data.	Underway	Council
	Relevant Council field staff to be trained in appropriate aquatic habitat management practices including the protocols for the control of disease (*Chytrid* fungus).	Underway	Council
	Incorporate information relating to the impacts of invasive species on local frog species into Council's invasive species management community awareness programs.	2010	Council, community, community groups
Community involvement	Support one frog identification workshop each year.	Commence 2010	Council, QM, community
	Incorporate frog habitat management information for landholders into community programs, including Wildlife Conservation Partnership program, Creek Catchment Ranger and Habitat Brisbane programs and the environment Centres curricula.	Ongoing	Council
	Support one workshop each year to inform community rehabilitation groups of frog-friendly techniques for rehabilitating waterways.	Commence 2010	Council, catchment and Habitat Brisbane groups
	Support community based monitoring.	Commence 2010	Council, community groups

* Council: Brisbane City Council, DTMR: Queensland Department of Transport and Main Roads, QM: Queensland Museum.

Guidelines

The habitat protection and management guidelines in Table 4 are provided to better assist environmental planners, land owners, land managers, private industry and the broader community to maintain and enhance existing tusked frog habitat in Brisbane. These guidelines are preliminary and will be refined as more information about these species and their habitat requirements becomes available.

Table 4: Habitat protection and management guidelines

Issue	Guideline	Explanatory notes
Destruction, clearing or alteration of aquatic habitats due to local catchment development and localised invasions of invasive plant species.	Apply the Biodiversity, Waterway, Wetland and Stormwater Management Codes, Ecological Assessment Guidelines, other relevant state legislation and any species-specific assessment criteria.	The guidelines provided within the existing codes are generally acceptable for most species but may require the refinement to maintain viable populations of tusked frogs. The largest identified threat to the persistence of tusked frogs is habitat loss due to urbanisation. Species specific guidelines will be developed to help Council and stakeholders protect populations when planning future development or changes in land use. The guidelines will suggest possible protective measures for frog populations under different situations. Existing habitat should be protected from future development wherever possible.
Habitat restoration or rehabilitation within the aquatic habitats or in vegetated areas surrounding breeding areas.	A minimum of 50 metres of intact terrestrial habitat and/or buffer should be retained and maintained around aquatic habitats. Further research is however required to inform the specific management requirements for tusked frogs.	Tusked frogs may require additional terrestrial habitat as refuge sites to ensure persistence during dry spells. Information about species' micro-habitat requirements is essential for habitat protection. Habitat restoration management plans must incorporate invasive weed removal and alternative techniques for the use of herbicides and pesticides.
Human activities.	Limit public access to known breeding areas and where possible, avoid undertaking works in these areas during the breeding season.	Ensure that recreational access, use of water bodies and Council activities do not inappropriately disturb wildlife utilising aquatic habitats.
	Educate landowners about the habitat requirements of tusked frogs and support landowners in conserving such habitat, particularly breeding habitats within farmland or areas close to agricultural practices.	Land use practices in areas near breeding sites should be monitored to ensure frog habitats are not contaminated by run-off of sediment, fertilisers and pesticides, which could cause eutrophication of the aquatic habitat. Trampling of terrestrial habitat surrounding breeding areas by domestic stock and wild pigs should also be monitored.
Mosquito control.	Employ 'best practice' principles, and use methods that are deemed 'safe' for frogs. Mosquito control should not be carried out during known frog breeding seasons.	Council will continue to use mosquito control products that are not harmful to frogs. It will maintain its membership of the Mosquito and Arbovirus Research Committee to support research that ensures the use of world best practice in mosquito management.

8 Management intent continued...

Actions continued...

Table 3: Habitat protection and management guidelines continued

Issue	Guideline	Explanatory notes
Displacement of frog populations due to localised invasions of invasive plant and animal species.	Invasive species management activities in important tusked frog habitat areas should incorporate mosquitofish and cane toad control.	Certain invasive species may need to be locally eradicated to maintain tusked frog population viability at a given location. This may be particularly important in areas overcome by mosquitofish and cane toads.
Lack of knowledge.	Landowners, community conservation groups and the broader community to be made aware, through existing Council programs, of habitat requirements, threats and management recommendations in areas known to support tusked frog populations.	Information on habitat requirements, threats and management recommendations should be made readily available to the community, particularly Habitat Brisbane and catchment groups, Wildlife Conservation Partnership program landowners and landowners in areas known to support tusked frog populations or where frog habitat is under threat.
Community Involvement.	Community groups involved in restoration and rehabilitation works should, where relevant, be encouraged to consider the habitat requirements of local frog species. Any activities undertaken must not negatively impact on the local frog population.	By fostering community involvement, suitable frog habitat on privately owned and public land can be restored, as can linkages that form dispersal corridors between breeding areas. If an area already supports a diversity of frog species, expert advice should be sought before commencing further restoration work to enhance the frog habitat as restoration may not be necessary or may be detrimental to the existing balance.

9 Further information

Agencies

- Brisbane City Council (www.brisbane.qld.gov.au)
- Department of Environment, Water, Heritage and the Arts (www.environment.gov.au)
- Frogs Australia Network (www.frogsaustralia.net.au)
- Queensland Department of Environment and Resource Management (www.derm.qld.gov.au)
- Queensland Frog Society (www.qldfrogs.asn.au)
- Queensland Museum (www.qm.qld.gov.au)
- RANA Frog Group (www.ranafrog.org.au)
- Threatened Species Network (www.wwf.org.au)

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