

Approved Conservation Advice for *Litoria aurea* (green and golden bell frog)

(s266B of the *Environment Protection and Biodiversity Conservation Act 1999*)

This Conservation Advice has been developed based on the best available information at the time this Conservation Advice was approved; this includes existing and draft plans, records or management prescriptions for this species.

Description

Litoria aurea (green and golden bell frog), family Hylidae, is a large, dull olive to bright emerald-green frog that grows to 85 mm in length (Cogger, 2000). The dorsum (back) of the frog has large irregular blotches ranging from brown to rich golden-bronze. It has a cream or yellow dorso-lateral skin fold (stripe) running from behind the eye to the lower back that is bordered by a black stripe that can extend through the eye to the nostrils. The hind toes of the frog are almost fully webbed, but the fingers of the front feet lack webbing. The frog also has a distinct tympanum (ear membrane) (Cogger, 2000). Breeding occurs in spring and summer, but peaks in January and February following heavy rain (Daly, 1995, cited in DEWHA, 2009b; White, 2001, cited in DEWHA, 2009b).

Conservation Status

The green and golden bell frog is listed as vulnerable under the name *Litoria aurea* Green and Golden Bell Frog. This species is eligible for listing as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) as, prior to the commencement of the EPBC Act, it was listed as vulnerable under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth).

The species is also listed as endangered under the *Threatened Species Conservation Act 1995* (New South Wales) and vulnerable under the IUCN Red List of Threatened Species: 2013.1 (Hero et al., 2004).

Distribution and Habitat

The green and golden bell frog occurs on coastal lowlands between Yuraygir National Park in New South Wales and Lake Tyers in Victoria (ALA, 2013). Since 1990, targeted surveys for the species have occurred across its range (Gillespie 1996; White & Pyke, 1996, 2008). In 2008, 30 populations were known in New South Wales (White & Pyke, 2008) and records are clustered in Yuraygir National Park, Gosford, greater Sydney, Kempsey-Port Macquarie, Hexham-Newcastle-Ravensworth-Mungo Brush, Illawarra-Batemans Bay and Eden-East Gippsland (DEC, 2005). The species is only confirmed from one inland site near Captains Flat (Osborne et al., 2008) after previously being recorded from the Southern, Central and New England Tablelands (NSW NPWS 2004).

Prior to the 1980s the species was extremely common along the coast of New South Wales and more widespread in the coastal hinterlands, southern highlands, central tablelands and southern tablelands (White & Pyke, 1996; DEC, 2005). In New South Wales, it is now considered absent from at least 90% of its former distribution having declined in extent of distribution, the number of sites where it occurs and, for some populations, the number of individuals (White & Pyke, 2008). Declines in East Gippsland have not been as severe as in New South Wales and although the western range limit has contracted, there is largely intact coastal habitat east of Lakes Entrance (Gillespie, 1996).

The green and golden bell frog has been recorded in a range of permanent/ephemeral and natural/manmade aquatic habitats, but is primarily associated with lentic (still) rather than lotic (fast flowing) water (Gillespie, 1996; Pyke & White, 1996; NSW NPWS, 2003). It utilises both natural (coastal swamps, marshes, dune swales, lagoons, lakes and other estuary

wetlands as well as riverine floodplain wetlands and billabongs) and man-made water bodies (storm water detention basins, farm dams, bunded areas, drains, ditches and other excavations capable of capturing water such as quarries and brick pits, minor structures such as tanks, safety bunds surrounding storage tanks, wells, cavitation pits, water troughs, old laundry tubs and baths) (Gillespie, 1996; Pyke & White, 1996).

Breeding has been recorded in still, shallow and unshaded aquatic sites with emergent aquatic plants and free of predatory fish (Gillespie, 1996; Pyke & White, 1996) and is more frequent in ephemeral ponds rather than fluctuating or permanent ponds (Pyke & White, 1996).

Adjacent terrestrial habitat usually consists of grassy/cleared areas or low vegetation with diurnal and over-wintering shelter sites (Gillespie, 1996; Pyke & White, 1996). If vegetation is present, it is generally no taller than woodland (Pyke & White, 1996), but adjacent forest has been reported (Gillespie, 1996).

In Sydney and the Illawarra, the species has been recorded in sites with high concentrations of heavy metals (Threlfell et al., 2008). It has been suggested that these pollutants may inhibit the growth and proliferation of chytrid fungus (*Batrachochytrium dendrobatidis*) (Lane & Burgen, 2008, cited in Ficken & Byrnie, 2013; Threlfell et al., 2008) although declines of other *Litoria* spp. have been observed at sites with similar rates of pollution (Ficken & Byrnie, 2013) and fertiliser, pesticide and metal pollutants are known to cause a range of severe negative impacts to frogs (Mann & Bidwell, 1999).

This species occurs within the Sydney Basin, NSW North Coast, South East Corner and South Eastern Highlands IBRA Bioregions and the Northern Rivers, Hunter-Central Rivers, Hawkesbury-Nepean, Central West, Murrumbidgee, Southern Rivers, East Gippsland and West Gippsland Natural Resource Management Regions.

The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities:

- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia.
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.
- Shale/Sandstone Transition Forest.

The Department of the Environment has prepared survey guidelines for *Litoria aurea*. The survey guidelines are intended to provide guidance for stakeholders on the effort and methods considered appropriate when conducting a presence/absence survey for species listed as threatened under the EPBC Act. <http://www.environment.gov.au/resource/survey-guidelines-australias-threatened-frogs-guidelines-detecting-frogs-listed-threatened>

Threats

The main identified threats to the green and golden bell frog are:

- habitat destruction and degradation, which are the biggest causes of recent local extinction (White & Pyke, 2008).
- changes to the structure and diversity of aquatic vegetation (DEWHA, 2009b).
- habitat fragmentation (DEWHA, 2009b).
- predation of eggs and tadpoles by plague minnow (*Gambusia holbrooki*) (Morgan & Buttemer, 2006) and, to a lesser extent, European carp (*Cyprinus carpio*), goldfish (*Carassius auratus*), brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) (DEC, 2005).
- infection with amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) (DEC, 2005).

- changes to hydrology, including inappropriate opening of coastal lagoon estuaries and changes to flow/flooding regimes of streams and wetlands (DEC, 2005; DEWHA, 2009b).
- changes to water quality (pollution, herbicide run-off, siltation, erosion and changes to timing and duration of flood events) (DEC, 2005; DEWHA, 2009b).
- intensification of public access to habitat (DEWHA, 2009b).

The main potential threats to the green and golden bell frog include:

- predation of adults by European red foxes (*Vulpes vulpes*), cats (*Felis catus*), dogs (*Canis lupus familiaris*), rats (*Rattus spp.*) and natural predators.
- road mortality.
- interaction with cane toads (*Rhinella marina*).
- grazing and trampling of habitat.
- inappropriate fire regimes (DEC, 2005).

Research Priorities

Research priorities that would inform future regional and local priority actions include:

- More precisely assess in-situ and ex-situ biology and the relative impacts of threatening processes, particularly the impact of road mortality, predation, interactions with cane toads, mowing of habitat and inappropriate estuary management.
- Identify optimal fire regimes to maintain habitat, and response to other prevailing fire regimes.

Regional Priority Actions

The following regional priority recovery and threat abatement actions can be done to support the recovery of the green and golden bell frog:

Habitat Loss, Disturbance and Modification

- Enhance habitat at known sites and develop/restore links between existing populations (White & Pyke, 2008).
- Manage catchments to improve stormwater quality and retain and manage habitat.
- Investigate and implement strategies to provide disease-free and fish-free breeding habitat.
- Implement existing management plans for key populations in New South Wales.
- Ensure there is no disturbance in areas where the green and golden bell frog occurs, excluding necessary actions to manage the conservation of the species.
- Manage any changes to hydrology that may result in changes to water table levels and/or altered run-off, sedimentation, pollution or altered tide incursion.
- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible.

Invasive Weeds

- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on the green and golden bell frog.

Animal Predation or Competition

- Develop and implement a management plan to control the adverse impacts of plague minnow in the region.

Fire

- Once optimum fire regimes are identified, develop and implement a suitable fire management strategy for the habitat of the green and golden bell frog.
- Where appropriate provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigative measures in bush fire risk management plan/s, risk register and/or operation maps. The NSW Rural Fire Service recommends no hazard reduction burning within 50 metres of wetlands and other large water bodies where the species is known to occur (NSW RFS, 2006).

Conservation Information

- Raise awareness of the green and golden bell frog within the local community, possibly with pamphlets, newsletters and training workshops on the species presence, identification of frogs, handling and hygiene protocols (e.g. NSW NPWS, 2003b), and monitoring techniques.
- Engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions.
- Review existing translocation trials, ensuring that genetic risks and benefits are assessed (as per Weeks et al. 2011), and make recommendations on the direction of future trials, incorporating recommendations of Burns and colleagues (2007) on the appropriateness of source populations for translocations.
- Maintain and enhance captive bred populations.

Local Priority Actions

The following local priority recovery and threat abatement actions can be done to support the recovery of the green and golden bell frog.

Habitat Loss, Disturbance and Modification

- Monitor known populations to identify key threats.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Control access routes to suitably constrain public access to known sites on public land.
- Suitably control and manage access on private land and other land tenure.
- Undertake survey work in suitable habitat and potential habitat to locate any additional populations/occurrences/remnants.
- Minimise adverse impacts from land use at known sites.
- Protect populations of the listed species through the development of conservation agreements and/or covenants.

Trampling, Browsing or Grazing

- If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species habitat.
- Where appropriate, manage total grazing pressure at important sites through exclusion fencing or other barriers.

Animal Predation or Competition

- Control introduced pests (plague minnow, European carp, goldfish, European red foxes, rats) and feral animals (dogs, cats) to manage threats at known sites.

Diseases, Fungi and Parasites

- Develop and implement suitable hygiene protocols to protect known sites from further outbreaks of chytrid fungus.
- If necessary, implement appropriate management actions to minimise the adverse impacts of existing chytrid fungus outbreaks

This list does not necessarily encompass all actions that may be of benefit to the green and golden bell frog, but highlights those that are considered to be of highest priority at the time of preparing the Approved Conservation Advice.

Existing Plans/Management Prescriptions that are Relevant to the Species

- Best practice guidelines for restoration of green and golden bell frog habitat (DECC, 2008a).
- Commonwealth Government significant impact guidelines (DEWHA 2009a, 2009b) and New South Wales Government environmental impact assessment guidelines (NSW NPWS, 2003a).
- New South Wales draft recovery plan (DEC, 2005) and management plans for twelve key populations (see OEH, 2013).
- New South Wales hygiene protocol for the control of disease in frogs (DECC, 2008b) and threat abatement plan for the plague minnow (NSW, NPWS 2003b).

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

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