Survey Standards: Giant Burrowing Frog, *Heleioporus australiacus*

1 Purpose

This document outlines the standards required for surveying fauna species listed under the *Flora and Fauna Guarantee Act* 1988 (FFG Act). These standards detail acceptable survey methods and the minimum survey effort to determine the likelihood of the species' presence or absence at a site. They also detail appropriate record keeping and reporting standards.

There are two main purposes of these standards.

1. To document the information required to determine if a record is valid – i.e. determining presence only. The standards provide the information that is required to enable an assessment to be made as to whether a record can be accepted as a valid record. All records, irrespective of how they are obtained, need to adhere to these standards.
2. To document the information required for surveys that aim to determine both presence and absence – i.e. outlining the acceptable level of survey effort required to provisionally infer absence if a species is not detected during a survey. These minimum standards are required to be met by any organisation/group undertaking a presence/absence survey.

Executing and reporting a survey to these standards will support the Department of Sustainability and Environment (DSE) to make an assessment of the validity of a claim to species presence or absence at a site. Subject to DSE approval, alternative survey methods may be applied where the proponent provides an evidence-based rationale for the approach and a detailed description of the survey technique(s) and where the standards are considered to exceed those set out below. Alternatively, rather than undertaking surveys where optimal detection methods and certainty levels are unknown, a habitat-based approach could be taken, whereby the species is assumed to be present if the area provides suitable habitat.

These standards should be read in conjunction with the Action Statement for this species. In the context of timber harvesting operations they should be read in conjunction with the Code of Practice for Timber Harvesting and Forest Management Plans. As further information about the species and survey techniques becomes available, these standards will be reviewed and updated.

2 Introduction

The Giant Burrowing Frog *Heleioporus australiacus* is listed as Vulnerable under the federal *Environment Protection and Biodiversity Conservation Act* 1999. A National Recovery Plan for this species is currently being drafted. It is listed as threatened under the FFG Act, and categorised as Vulnerable (DSE 2007). The existing Action Statement (Mazzer 1994), is currently being revised.

The Giant Burrowing Frog is a little-known, cryptic species that is notoriously difficult to detect. It is restricted to south-eastern Australia, where it has been recorded from a variety of forest types, woodlands and heathlands (Gillespie 1997). Within Victoria this species has been recorded from elevations up to 1000 m above sea level (Gillespie 1990), between Walhalla and the NSW border, along the coastal side of the Great Dividing Range.

Giant Burrowing Frogs call from "beside smaller semi-permanent to permanent streams or dams or from burrows within the bank" (Anstis 2002). Outside of the breeding season, Giant Burrowing Frogs occupy activity areas that are typically 20 to 250 m from breeding sites in streams, where they shelter in burrows (Penman *et al.* 2008a). Further background information on the species is provided in Appendix 1.

3 Requirements to demonstrate presence

Giant Burrowing Frogs have been detected using the following survey methods (DEWHA 2010a):

1. Searching for adult frogs while driving slowly along roads and tracks in forested areas after storms and heavy rain during warm weather.
2. Advertisement call surveys: listening for calling males during the breeding season.
3. Visual encounter surveys.
4. Tadpoles searches: searching and dipnetting for tadpoles in suitable water bodies during times of year when tadpoles would be expected to be present.
5. Pitfall trapping.
6. Searching for egg masses.

Penman *et al*. (2006), however, notes that detecting Giant Burrowing Frogs "has proven to be difficult as it calls infrequently and unpredictably, is difficult to detect during visual surveys and pit-trapping success is low".

3.1 Acceptable records

The following types of records are considered acceptable as evidence of the occurrence of Giant Burrowing Frogs at a site.

1. Voucher specimens of adult frogs.
2. Identifiable photographs of adult specimens. Giant Burrowing Frogs are distinctive, and reasonable photographs will permit identification. Photographs should show morphological features of the frogs adequate for positive identification.
3. Digital or analogue recordings of male advertisement calls identifiable as Giant Burrowing Frogs. The call of this species is distinctive, and unlikely to be confused with other frogs in Victoria. A recording of the call is available from http://frogs.org.au/frogs/species/Heleioporus/australiacus/ for reference purposes.
4. Voucher specimens of identifiable eggs or tadpoles.

All records require independent verification (by examination of specimens, photographs or recordings) by an experienced amphibian biologist.

3.2 Expertise required and reporting standards to show presence

The Giant Burrowing Frog is a distinctive species that should be readily identifiable by frog biologists experienced in the identification of Victorian frogs. Photographs should be taken of any adults detected during surveys, to provide evidence to back up any tentative field identifications. Consideration should also be given to taking voucher specimens of adult Giant Burrowing Frogs, subject to conservation and ethical considerations, and permit requirements.

Larvae could potentially be confused with those of *Limnodynastes* species that co-occur with Giant Burrowing Frogs. Anstis (2002) provides a description of the tadpole of the Giant Burrowing Frog, and notes that "the blue-grey venter and the large, plump, heavy body of *Heleioporus* are distinctive". Despite this supposed distinctiveness, tadpoles can be difficult to confidently differentiate between genera and species, especially for inexperienced personnel. Consequently, retention of voucher specimens of tadpoles of Giant Burrowing Frogs collected during any targeted surveys for the species are required, to allow independent confirmation by an experienced amphibian biologist.

The following data are required to support a record of a Giant Burrowing Frog:

- name and contact details of the observer (including indicating that they will make themselves available to escort an independent validator to the site if required);
- permit details of the surveyors (i.e. a research permit under the Wildlife Act, a research permit under the National Parks Act if working within a Park and consent from DSE Land and Fire Division if working in State Forest);
- details of the species present and number of individuals detected;
- date and time of record;
- precise geographic location of record (written location and GPS coordinates);
- photographic evidence of the location with a fixed relocatable feature in the frame to enable validation if required;
- details of the method of obtaining the record, including the sampling effort and equipment used;
- description of the area of water bodies searched;
- prevailing meteorological conditions (rainfall and air and water temperature in particular); and
- documentation of supporting evidence: photograph, call recording or voucher specimen.

This is the core information required for records to be entered onto the Atlas of Victorian Wildlife. Records of all other frog species observed at the site should also be submitted to the Atlas of Victorian Wildlife.

4 Requirements to demonstrate presence/absence

While it is relatively straightforward to document the presence of a species, it is more difficult to determine if a species is truly absent if it was not recorded during a survey, or alternatively if the survey was not adequate to reliably record the species if it was present.

Given the paucity of records and survey work that have been undertaken in Victoria for the Giant Burrowing Frog, there is no adequate data available to provide a basis for formally assessing the adequacy of any given level of survey effort, or the relative merits of alternative survey techniques for detecting populations of the species at sites where they occur. Accordingly, surveys which fail to detect the Large Brown Tree Frog need to be interpreted with caution.

4.1 Survey effort

A number of authors have suggested survey protocols for this species (Gillespie 1997, 2010, Penman *et al*. 2006, DEWHA 2010b, Brown and Saddlier 2010). Techniques that are

commonly used to detect other species of frogs do not apply well to the Giant Burrowing Frog, and alternative methods are required (Penman *et al.* 2004). Until more information is available on detection probabilities for this species, the Gillespie (1997 and 2010) recommendations, outlined below, should be followed.

In the absence of data on detection probabilities, thorough surveys are required using multiple methods (spotlight search, call survey, tadpole dipnetting) in each area, to maximise the chance of encountering the species if it is present. Surveys should be conducted over multiple days at each location. Surveys should also extend outside of the immediate proposed area of impact, as occurrences of the species in adjacent areas, may make the presence of an undetected population within the area of interest more likely.

Different areas need to be searched for adults and tadpoles. When not breeding, adult frogs disperse into the forest and occupy non-riparian habitats, 20 – 250 m from the water-bodies where breeding occurs (Penman *et al.* 2008a). Migrations to breeding sites are associated with rainfall events, with such movements either on the night of rain, or within 10 days of rainfall exceeding 20 mm (Penman *et al.* 2008a).

Surveys for adults

- Road transects should be investigated during the day for water-bodies such as dams, culverts, swamps, quarries and the like. These features should then be sampled at night using spotlight surveys and call playback.
- Road searches for adult frogs should be carried out at night by driving slowly (5–20 kph; the speed depends on the experience of the surveyors). Repeated searches of road transects (a minimum of three) should be undertaken over multiple nights between February and April. If surveying a relatively small area (e.g. a coupe), road searches conducted on foot are more effective.
- Spotlight searches should be undertaken at stationary water bodies. Upon arrival at a survey site at night, but prior to searches, surveyors should spend 5-10 minutes listening for frog calls. Call playback should be employed during the last minutes of the listening period. A thorough headlamp search of the water-body should then be undertaken.
- Nocturnal stream searches should be conducted of 1^{st}-3^{rd} order slow-flowing streams. The species does not appear to use swift rocky or cascading streams, or large water courses. Surveyors should wade up-stream and survey a minimum of 1 km.
- All sampling should be undertaken during optimal conditions, i.e. during thunderstorm activity or after rainfall (>5mm), when temperatures are above 8^{o}C, relative humidity is above 60% and in still or light wind conditions (Penman *et al.* 2006).

Tadpole searches

- Tadpole sampling should be conducted during the day in all pool habitats along 500 m stream transects, as well as in any stationary water-bodies near the stream. Sampling is conducted by dragging a dip net though each pool for a set time period, usually 1-2 minutes.
- In addition to large stationary water bodies, small permanent streams should also be thoroughly searched for tadpoles, as this species *appears* to prefer to breeding in these habitats.
- Tadpole surveys should be undertaken during the period when tadpoles are most likely to be detected, i.e. from autumn to October. To optimize detection, it is recommended surveys

are undertaken in May and repeated in October. A minimum of three censuses should be conducted at each site.

4.2 Timing considerations

The best time for detecting Giant Burrowing Frogs is likely to be correlated with periods of peak activity in terms of either movement or phases of breeding behaviour such as calling and the presence of egg masses and/or tadpoles. The best timing is dependent on the methods used; detection of tadpoles can occur long after calling activity has ceased (Gillespie 1997), and at times when adult frogs are not readily detectable. Anstis (2002) notes that, in the Sydney basin, metamorphosis may occur from October to April, and that in autumn and spring there may be two size classes of tadpoles present – those close to metamorphosis, and much smaller tadpoles. Larval lifespan is 3 – 11 months, and extends over winter in tadpoles from autumn egg masses (Anstis 2002). It is not known whether these patterns hold for populations in Victoria, although Brook (1980) noted eggs of this species in February.

Tadpole surveys should be undertaken in the period from autumn to October (Gillespie 2010). In contrast, late summer to mid-autumn appears to be the best time to survey for adult Giant Burrowing Frogs (Gillespie 1997, Penman *et al.* 2006, Brown and Saddlier 2010). The Atlas of Victorian Wildlife database contains only two records of calling Giant Burrowing Frogs, both of which occurred in February (Fig. 1). Data from Lemckert and Mahony (2008) for the species in New South Wales tends to indicate consistent call records between January and May, and most calls in February and November (Fig. 1); however, this is a very small dataset, and may represent biased sampling.

Within the appropriate survey periods, immediate weather conditions are likely to be the most important determinant of detection likelihood for adult Giant Burrowing Frogs in Victoria. Consequently, the ability of surveyors to respond quickly and opportunistically to weather events such as a storm or heavy rain following a period of warm to hot weather will be very important.

4.3 Reporting standards for presence/absence surveys

Surveys conducted for the Giant Burrowing Frogs should be properly and thoroughly documented to allow assessment of their adequacy. Should data subsequently become available that allows a more rigorous assessment of survey adequacy, any previous survey results can be re-assessed in light of such data.

The core data required for the "presence only" reporting (refer section 3.2) also needs to be provided for the presence/absence surveys. Additional data required to document presence/absence surveys is outlined below. This information needs to be provided for all surveys, including those that did not detect the species.

- date and times of all surveys;
- survey methods and equipment used;
- duration of survey and search effort for each method; and
- extent of the area searched for frogs.

Appendix 1. Background

There is a clear need for an improved understanding of the distribution and habitat associations of the Giant Burrowing Frog in Victoria. There are very few recent, verified records of this species in this state. It is unknown whether the species has undergone a decline in abundance or distribution, but catastrophic declines of numerous frog species on the eastern seaboard of Australia suggest that we should not be complacent, especially for a species that is so difficult to detect and monitor. Targeted surveys of appropriate habitats, followed by long-term monitoring of detected populations, in West and East Gippsland would be required to address this knowledge gap.

The reliability of various recommended survey methods is unknown, and current recommendations are not based on rigorously collected data. Properly designed surveys could assess the relative performance of alternative survey methods for the species, and determine the likely rate at which surveys of a given type and intensity will fail to detect the species at sites where it is actually present.

Little is known of the impact of timber harvesting on this species. Based on studies in New South Wales, Penman *et al.* (2008b) assert that logging is likely to have a significant short-term impact on populations of Giant Burrowing Frogs, and that the medium- to long-term impacts of logging are "not clear". Penman *et al.* (2008a) outline streamside buffer zones and other exclusion zones recommended for Giant Burrowing Frogs in New South Wales and Victoria. They note that "implementing stream-side buffer zones can probably not be applied effectively if both timber production and species conservation are the management aims" (p.184). They further note that "a 300-m buffer zone, as suggested by Semlitsch and Bodie (2003), will very likely protect most of a Giant Burrowing Frog population and so be effective for conservation, but would not be practical if timber production was to continue. In areas occupied by Giant Burrowing Frogs, more than 95% of a catchment falls within 300-m of a potential breeding site, therefore for all intents and purposes 300-m buffer zones would function essentially as complete exclusion zones". Where timber production and conservation of Giant Burrowing Frogs are parallel goals, Penman *et al*. (2008a) recommend the specific reservation of several known populations rather than attempting to buffer key habitat features. As there are no 'known' populations in Victoria in terms of geographically and spatially definable populations of Giant Burrowing Frogs, this approach is not currently feasible in this state, and further investigations are required.

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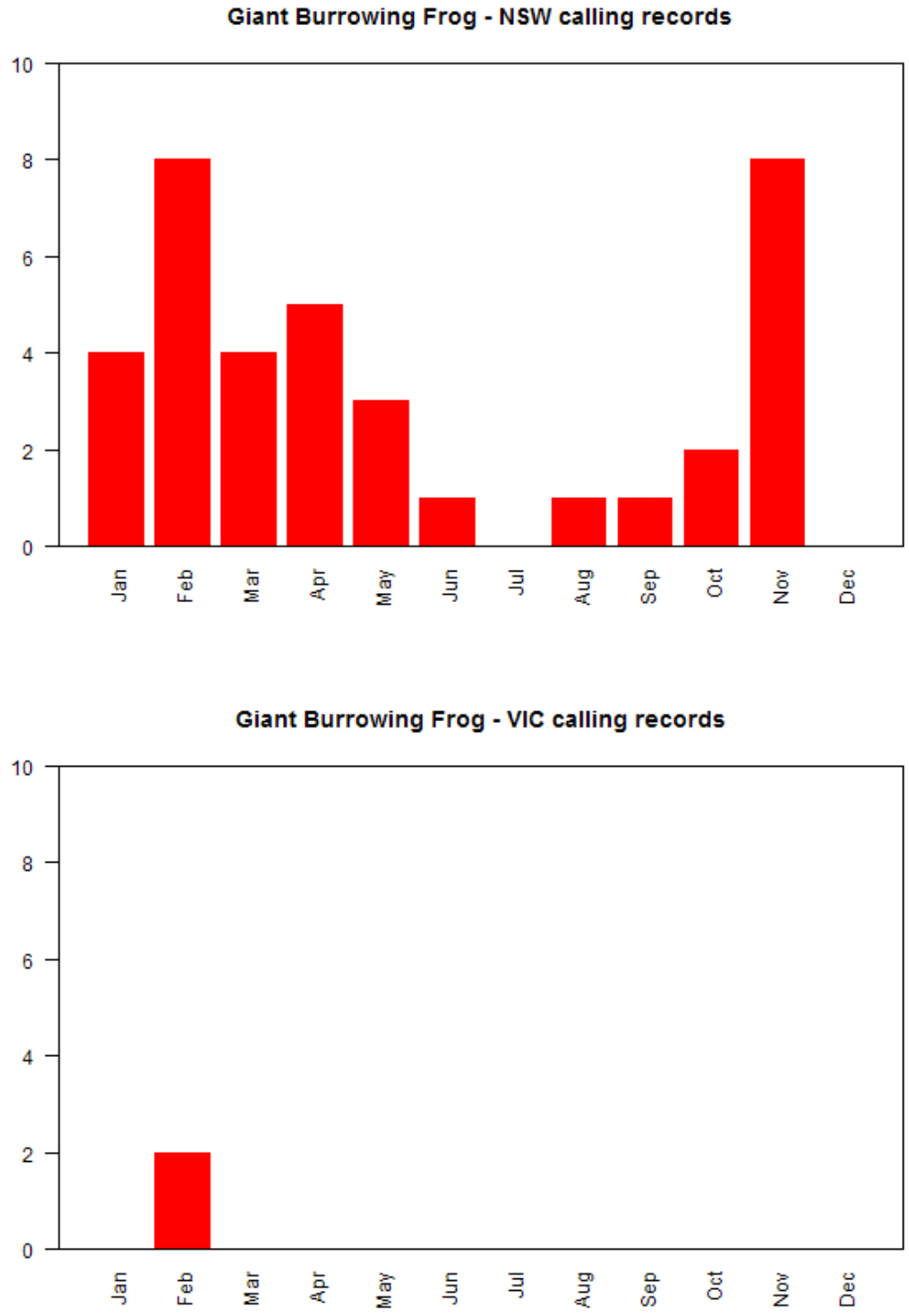

Figure 1. Seasonality of calling activity for Giant Burrowing Frog *Heleioporus australiacus* from New South Wales (data obtained from Lemckert and Mahony, 2008), and from Victoria (data obtained from the Atlas of Victorian Wildlife).