
Management Plan for a population of Bibron's Toadlet (*Pseudophryne bibronii*) occurring at Happy Valley, Castlemaine

Prepared for Castlemaine Landcare Group



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All photographs by Karl Just except where otherwise credited.

Cover photos: Top: Bibron's Toadlet habitat at Happy Valley Bottom left: Bibron's Toadlet. Bottom centre: Southern Brown Tree-frog. Bottom right: Bibron's Toadlet.

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1.0 Introduction

1.1 Project Context

Castlemaine Landcare Group commissioned the author to prepare a management plan for an area of land containing a population of the endangered Bibron's Toadlet (*Pseudophryne bibronii*) in Castlemaine, Victoria. This initiative is part of a broader project funded through a Community Volunteer Action Grant received from the Department of Environment, Land, Water and Planning (DELWP) that includes restoration and monitoring of the site.

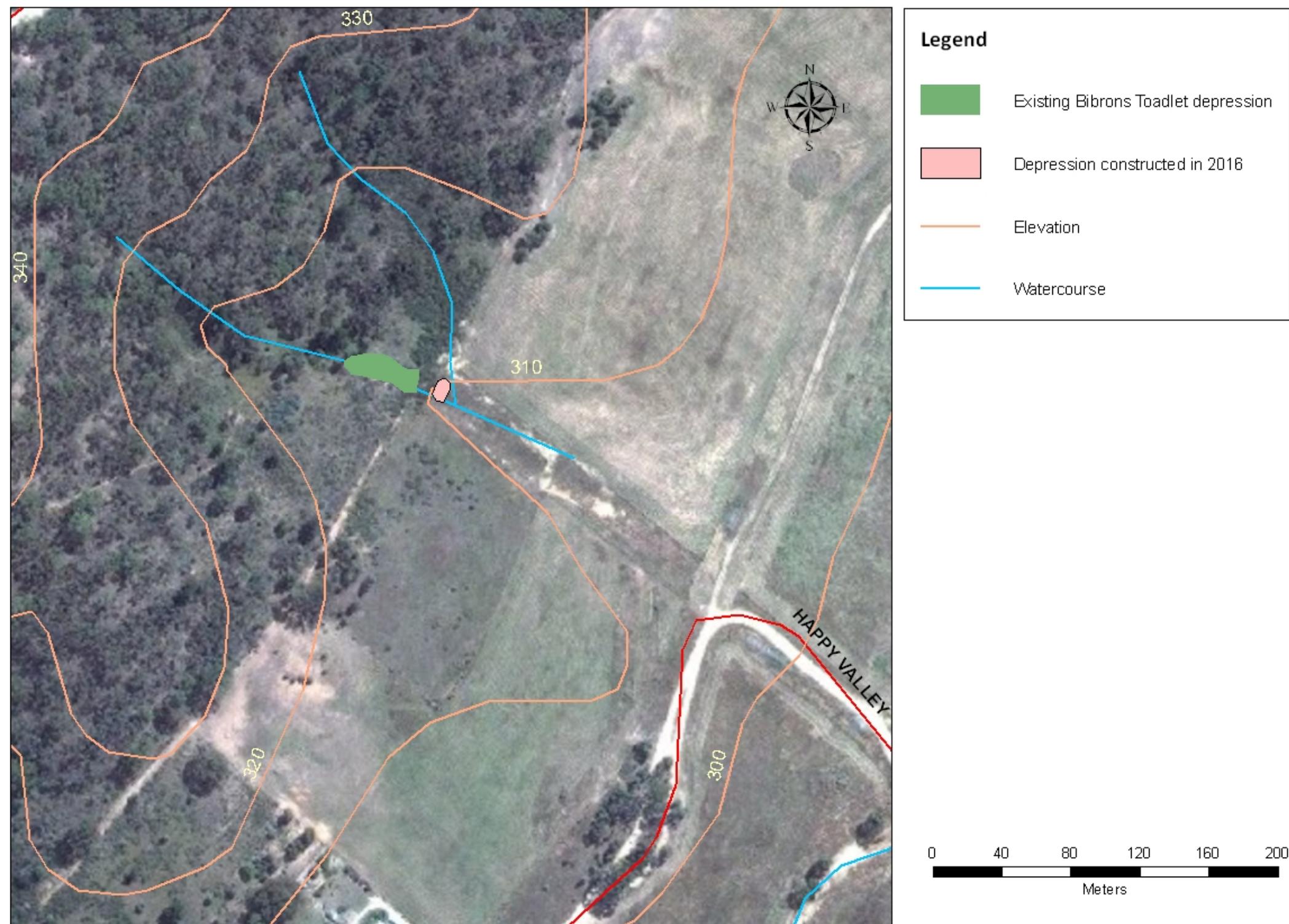
As part of the project the author implemented a range of management actions and established a monitoring program. All works were undertaken between January-June 2016.

1.2 Study area

The study area occurs on a disused road reserve managed by Mount Alexander Shire Council. It encompasses part of an ephemeral gully that flows east from the hills of Kalimna Park, a low range (350-360 metres above sea level) that runs from north to south to the immediate east of the township of Castlemaine. The gully has been artificially dammed in the past by construction of a low earth wall, while part has been shallowly excavated. A new artificial pond was excavated in this area for frog habitat in May 2016 (see below). The study area also included the lower slopes surrounding the gully, for a radius of approximately 20 metres.

The study area is shown in Figure 1.

Figure 1 - The Happy Valley Bibron's Toadlet Site



2.0 Background

2.1 The distribution and ecology of the Bibron's Toadlet (*Pseudophryne bibronii*)

The Bibron's Toadlet (also known as the Brown Toadlet) is a small ground-dwelling frog that has a warty brown-grey back, a black and white marbled belly and yellow-orange armpits (Tyler & Knight 2011). A distinctive feature of the *Pseudophryne* is that they do not commonly hop, but instead crawl.

The Bibron's Toadlet is found throughout eastern Australia, from Port Lincoln in South Australia to northern Queensland. The species occupies a very wide range of habitats across this range, but generally prefers ephemeral gullies and depressions that remain moist or are partially inundated between autumn and spring.

Plate 1 The Bibron's Toadlet (*Pseudophryne bibronii*) at Happy Valley



Ecology

The Bibron's Toadlet is one of only several Victorian species that breeds only in autumn (Howard et. al. 2010), with males becoming active soon after the first autumn rains in March. They construct a small burrow beneath leaf litter or among patches of vegetation (commonly sedges and rushes),

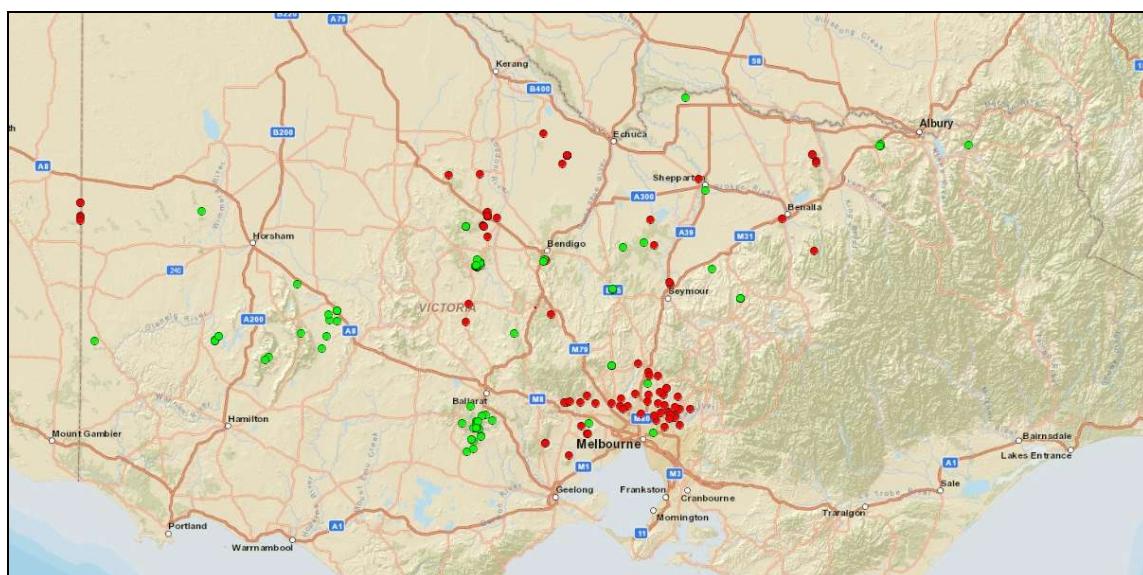
where they periodically call by emitting a short 'cre-ek' every few seconds, most commonly after rain. If a male succeeds in attracting a female, she deposits up to 100 eggs which are then fertilised by the male. He then remains in the burrow to tend to the eggs until hatching (leading to another common name of 'brooding-frog'). If adequate rainfall occurs and the burrow remains moist, the tadpoles emerge in (mostly early) winter. To survive over the next few months, it is essential that enough rainfall occurs to periodically flood or inundate the burrow. Once maturity is reached during spring, the young frogs most likely burrow into the ground or find shelter beneath rocks and logs. They aestivate over the hotter months, before remerging the following autumn. Adult frogs feed on a range of small invertebrates.

Victorian Distribution

In Victoria, the Bibron's Toadlet is widely but sparsely distributed, with the largest concentration of populations occurring across the drier areas of central Victoria. South of the Divide, the species is mostly replaced by the closely related Southern Toadlet (*Pseudophryne semimarmorata*), although the two species intergrade and hybridize in areas where their respective ranges overlap (e.g. near Kilmore).

While the Victorian Biodiversity Atlas (VBA) contains few records of Bibron's Toadlet for the Castlemaine area, the area supports a relatively large number of sub-populations, with the largest concentration occurring along ephemeral creeks and gullies between Castlemaine and Fryerstown. The species is less common to the east of Castlemaine and is known from no other sites in the Happy Valley area (personal observation).

Plate 2 The distribution of Bibron's Toadlet in Victoria. Records older than 20 years are shown in red and highlight potential areas of decline.



Threats

The Bibron's Toadlet is listed as endangered under the Victorian Advisory List and as threatened under the Flora and Fauna Guarantee Act (DEPI 2013). The species appears to have declined throughout some areas of its range and has almost disappeared from the Melbourne area where it once occurred.

Key threats include:

- alteration to waterways through stormwater input, increasing the frequency and level of flooding and occasionally adding heavy metals;
- land development;
- the effects of chytrid fungus;
- degradation of habitat, including weed invasion, heavy grazing pressure and shrub closure.
- Climate change and drought – the species is unable to successfully breed without adequate autumn and winter rainfall, so that eventually adults die without producing young.

2.2 The Bibron's Toadlet population at Happy Valley

The Bibron's Toadlet was first discovered at the Happy Valley site by the author in autumn 2014, when approximately four males were heard calling on two separate occasions. Considering that the area of occupation was proposed to be developed into a road as part of a housing sub-division on adjacent private land (DPS 2015), the discovery was reported to the local planning authority, Mount Alexander Shire Council. The proposal for the sub-division has yet to be assessed by Council and so the long-term security of the site is still unknown. In autumn 2015, the site was visited on one occasion and several Bibron's Toadlet were heard calling.

More detailed monitoring and census of numbers commenced in autumn 2016, with the first calling males recorded on the 23rd of March. Over the months of March and April, several counts revealed that there were approximately 15 calling males present at the site. It is therefore likely that the total population is somewhere between 20-30, although this number could potentially increase in wet years.

The population was concentrated across an area of approximately 90 square metres. The males were mostly heard calling from small depressions with a high cover of *Juncus* and associated litter on the edge of the gully, where inundation is only shallow rather than deep. A number of native grasses

dominated parts of the higher slopes, including *Themeda triandra* (Kangaroo Grass) and *Rytidosperma* spp. (Wallaby-grass). Prior to the commencement of management, the surrounding land was heavily dominated by mature Gorse and Blackberry up to the edge of the gully. The areas beneath these weed infestations were mostly bare of groundflora.

2.3 Other frog species recorded at the project site

A relatively high diversity of frog species was recorded at the project site between January and June 2016, particularly in the two weeks following heavy rain in late January. This final tally was eight species, representing over 90% of the total number of frog species occurring in the Castlemaine area. Among the list included a single Common Spadefoot Toad heard calling following the January rain, a species which is very rare in the local area. The Common Spadefoot Toad spends most of its life cycle aestivating beneath the ground and only emerges to breed following heavy summer-autumn rains.

Table 1 Frog species recorded at the project site in 2016

Common name	Scientific name
Banjo Frog	<i>Limnodynastes dumerili</i>
Bibron's Toadlet	<i>Pseudophryne bibronii</i>
Common Froglet	<i>Crinia signifera</i>
Common Spadefoot Toad	<i>Neobatrachus sudelli</i>
Peron's Tree-frog	<i>Litoria peronii</i>
Plains Froglet	<i>Crinia parastigmifera</i>
Southern Brown Tree-frog	<i>Litoria ewingii</i>
Spotted Marsh-frog	<i>Limnodynastes tasmaniensis</i>

Plate 3 Banjo Frog (*Limnodynastes dumerili*)



Plate 4 Southern Brown Tree-frog (*Litoria ewingii*)



Plate 5 Common Froglet (*Crinia signifera*)



Plate 6 the characteristic marbled black and white belly of the Bibron's Toadlet



2.4 Aims of the management program

An assessment of the Happy Valley site found that it was subject to several degrading processes and that it could be improved through management and restoration. The most concerning issue was weed invasion, as dense thickets of **Ulex europaeus* (Gorse) and **Rubus fruticosus* sp. agg. (Blackberry) occurred to the very edge of the depression and in many cases were over-hanging areas of habitat. The depression was also relatively bare with only small patches of *Juncus* spp. (Rush), so that it was clear that habitat improvement works could be undertaken to increase cover and suitable sites for breeding. The main aims of the project were therefore to:

- Reduce weed cover;
- Plant a range of sedges, grasses, rushes and herbs;
- Install habitat features such as roofing tiles, branches and logs;
- Increase community awareness of the site by including Landcare members during working bees.

3.0 Works Undertaken in 2016

The management of the site began in January 2016. The works are described below.

3.1 Weed control

Prior to the commencement of work, the cover of **Ulex europaeus* (Gorse) around the perimeter of the depression containing the frog population was approximately 60-70%, while several thick patches of **Rubus fruticosus* sp. agg. (Blackberry) occurred on the eastern side. During the course of the January-June management program, Gorse and Blackberry were completely removed around the two metres fringing the entire depression. This equated to roughly 20m² of dense, mature Gorse and Blackberry.

The Gorse plants were removed by first trimming branches to allow access and then cutting plants at the base. They were then quickly treated with a solution of Glyphosate (no herbicide was applied near potential frog habitat). Any re-shooting Gorse plants observed in the following months were re-treated with the Glyphosate mixture. The dense patches of Blackberry were reduced in density prior to control by cutting with hedge trimmers or a brush-cutter, before the bases were also cut and painted with Glyphosate.

Plate 7 Before weed control



Plate 8 After weed control



The area downslope of site had a high cover of **Cirsium vulgare* (Spear Thistle). The majority of these were removed by Castlemaine Landcare during a working bee by digging plants out with a mattock.

3.2 Installing roofing tiles

Six roofing tiles were placed across the site to provide cover and habitat for frogs. This resulted in a Bibron's Toadlet being recorded beneath a tile on the 31st of March, while a second created a burrow beneath a different tile around the 3rd of April. By the 8th of April, a female was recorded with the male several times over a two week period. Approximately 20 eggs were then recorded at this site on the 18th of May (when inundated) but no frogs were in attendance.

Other frog species recorded beneath the tiles included Southern Brown Tree-frog (*Litoria ewingii*) and Plains Froglet (*Crinia parasciaphera*).

Plate 9 The male and female Bibron's Toadlet recorded beneath a roofing tile. Approximately 20 eggs were located at this site on the 18th of May.



3.3 Constructed frog pond

On the 13th of May 2016, a new habitat pond was created 20 metres downslope of the existing habitat using a small excavator. Other works completed by the excavator including removing some Gorse and Blackberry and creating three rip lines into exotic groundflora for the June planting.

The new pond is approximately 10 metres long, five metres wide and is surrounded by *Juncus* spp. (Rushes). The central section is approximately 80 centimetres deep while the outer verge is approximately 50 centimetres deep to create a diversity of water depths and micro-habitats. Soil from the excavation was mounded onto the downslope side to catch water running from the gully.

The central area was covered in fresh leaf litter which will break down into ideal cover for frogs over the next 12 months. The pond and surrounding land was planted in June 2016 (see below). The pond filled to capacity following 14mm of rain in early July.

3.4 Planting

Following the heavy rain in January, 10 *Carex appressa* (Tall Sedge) were planted amongst the existing wetland to increase cover and habitat. This sedge is a major component of Bibron's Toadlet habitat elsewhere in the local area.

In June and July 2016, approximately 200 tubestock were planted at the site, including approximately 110 sedges, rushes and grasses and 90 shrubs. The sedges and rushes were mostly planted in the floor of the new pond while the shrubs were planted into three rip lines downslope. *Dianella admixta* (Black-anther Flax-lily) was planted on the mound with *Poa labillardieri* (Common Tussock-grass) downslope.

Plate 10 The newly constructed Bibron's Toadlet pond surrounded by the July plantings



4.0 Guidelines for Ongoing Protection and Management

The Bibron's Toadlet population is relatively small and isolated, making it essential that the site is subject to long-term protection and management. The following guidelines should be followed where possible, keeping in mind that new challenges are likely to arise in future that will require an adaptive management approach.

4.1 Site protection

The entire site that supports Bibron's Toadlet at Happy Valley is currently proposed to be developed into a sealed road and managed by Mount Alexander Shire Council (DPS 2015). At the time of writing, this proposal has been submitted by a developer to Council but will not be assessed until several reference documents are provided (Elizabeth Eager pers. comm.).

The construction of a road through the site would undoubtedly lead to the complete extinction of this FFG-listed species from the site. It is therefore critical that any development avoids impacting the area. Furthermore, even in the case where the site is excluded from an adjacent development, it is important that certain procedures are followed during and after the development phase to prevent degradation of habitat:

- The site should have a buffer from any form of land development of at least 50 metres;
- No heavy machinery should be permitted near the site during any construction to prevent impacts to habitat;
- No untreated stormwater should be channeled into the site as this would negatively alter the site hydrology and could lead to introduction of heavy metals;
- The site should be fenced to prevent the public from regularly walking through or close to the site.

In the case of any development going ahead, Castlemaine Landcare is seeking to work with Mount Alexander Shire Council to avoid impacts to the site.

4.2 Weed control

Weed control will be an essential component of ongoing management.

Follow up control

Follow-up control of Gorse and Blackberry will be required for all areas treated in 2016. Gorse in particular will require ongoing control due to its ability to produce large numbers of long-lived seed. Mature Gorse patches have been shown to produce between 6-21 million seeds per hectare per year, with each seed having a lifespan of at least 25 years (Gouldthorpe 2006). This means that unless efforts are taken to exhaust the seed bank, Gorse plants will continue to germinate in large numbers in perpetuity. The best way to stimulate the seed bank to allow total control is through burning, however this is not recommended around the Bibron's Toadlet population. Instead, it is likely that control of young plants will be required every one to two years, either through cut-paint or hand removal. Young seedlings (within 2 months of germination) can also be easily removed through scarifying the soil with a rake.

Control of weeds around plantings

Control of weeds should be prioritised around the 2016 plantings to ensure their success. Herbaceous weeds should be removed by hand from around the base of each planting prior to the weeds seed production. This work should mostly be carried out during winter-spring when the majority of annual herbaceous weeds are active. Based on current weed infestations, it is anticipated that the most threatening species are likely to include **Cirsium vulgare* (Spear Thistle), **Ulex europaeus* (Gorse) and a variety of exotic grasses.

Control of Gorse upslope

The area 10-20 metres north of the project site currently contains an extensive patch of Gorse that will be difficult to control by hand. Due to the near absence of native understorey species in this patch (excluding *Cassinia arcuata*), it could be considered for control using a grooming machine. If this were to take place, the area would ideally be burnt the following autumn to recruit the large number of soil-stored Gorse seeds, which could then be controlled. The site could then be panted or allowed to naturally regenerate (with periodic weed control). Removal of this extensive Gorse patch would not only be of benefit to surrounding native vegetation but would likely increase runoff into the frog depression downslope.

4.3 Monitoring

Ongoing monitoring of the Bibron's Toadlet population and surrounding habitat will be important to determine the effectiveness of management and to detect new and emerging threatening processes. Ideally, a count of frog numbers identified by call should be undertaken three times during the

breeding season, including once in mid-March, April and May. The counts should be undertaken after dusk and ideally after rain. Notes should be taken on where the frogs are calling from and any other features of interest.

5.0 Conclusion

The colony of Bibron's Toadlet off Happy Valley Road is the only known surviving population along the Forest Creek corridor. It is also one of the closest populations to the centre of Castlemaine. Ongoing protection and management of the site is therefore essential to protect this endangered species.

Works begun in 2016 have improved the quality of habitat by greatly reducing weed cover, creating a new habitat depression and planting a range of rushes, sedges and grasses. This management plan has documented these works as well as provided guidance for future management of the site.

6.0 References

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