

Growling Grass Frog habitat preferences and enhancement progress report 2009

D. Bryant
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Front cover photos (From left to right): Dam not supporting Growling Grass Frog, dam habitat supporting Growling Grass Frog, *Litoria raniformis*,

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Summary

The Growling Grass Frog (GGF), *Litoria raniformis*, is recognised as a threatened species at state, national and international levels. The frog historically occurred throughout much of Victoria, however, is now restricted to isolated populations across its range. A fungal disease (Chytridiomycosis) and modification and degradation to habitat are thought to be the processes driving the population decline.

This specific aims of the project are to:

- Improve knowledge on the distribution of GGF in Victoria;
- Better understand the ability to detect frogs at a location;
- Improve understanding of the habitat requirements of the GGF;
- Define and develop processes to enhance habitat for the GGF; and
- Increase suitable GGF habitat within Victoria in a time of climate change.

Distribution data derived from this project will be maintained in the Actions for Biodiversity Conservation (ABC) database and outcomes from the project will address several high priority actions for the species.

Known populations of GGF were established through historical records and prior knowledge and farm dams within a 2 km radius of these sites surveyed for the presence or absence of GGF. Study areas, incorporating the previously known location and surrounding farm dams were collectively referred to as a study cluster. Each cluster was surveyed three times during the GGF breeding season from October 2008 to February 2009 for adults and twice for tadpoles. This data, together with environmental variables for each site will be used to generate a model for predicting site suitability for the GGF. Dams not occupied by the GGF will be chosen for modification in an attempt to transform them into suitable habitat. Ten site clusters were established over four Catchment Management Authority regions with 125 sites surveyed in total.

Habitat enhancement of selected dams within the site clusters and the establishment of additional clusters will be the focus for 2009/10. Surveys to monitor the success of these enhancements will be performed over a further three breeding seasons.

1 Introduction

The Growling Grass Frog (*Litoria raniformis*) historically occurred throughout much of Victoria, however, it has shown marked population declines in recent decades. The species is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 and threatened under the Victorian *Flora and Fauna Guarantee Act* 1988. The threatening processes that are driving these declines are poorly understood, but are likely to include a fungal disease (Chytridiomycosis) and habitat modification or degradation.

The Growling Grass Frog (GGF) grows up to 85 mm as an adult and is olive to emerald green in color with various degrees of gold, brown, bronze or black mottling. It has a white under surface and is typically warty above. Breeding occurs in spring and early summer with the male call a growling “waaaaah waaaaah”, commonly described as a motor bike changing through gears. Tadpoles commonly grow to 90 mm in length and develop a bright green sheen. Breeding occurs in lakes, ponds, dams and pools in slow flowing water bodies. Habitat with emergent vegetation is preferred.

The utilisation of some farm dams for breeding and not others by GGF in rural landscapes has led to this project. The specific aims of the project are to:

- Improve knowledge on the distribution of GGF in Victoria;
- Better understand the ability to detect frogs at a location;
- Improve understanding of the habitat requirements of the GGF;
- Define and develop processes to enhance habitat for the GGF; and
- Increase suitable GGF habitat within Victoria in at time of climate change.

2 Methods

2.1 Site selection

Previously determined GGF populations were chosen from historical records, prior experience and personal communication with individuals with relevant knowledge of the study regions. Wetlands (generally farm dams) within a 1.5 km radius (preferably one kilometre if wetland numbers permit) from these source populations, were identified from aerial photos, landholder liaison and on ground inspections. Wetlands within the 1.5km radius, herein referred to as sites, together with their source population were termed site clusters. A total of 125 sites were surveyed for GGF with 86 sites proving suitable for this project. These sites comprised 10 clusters spread over four CMA regions (Table 1). Fewer sites were surveyed in the Corangamite, Wimmera and North Central catchments as these clusters were generally identified during field work in 2007/08 (see Smith *et al* 2008a).

Table 1. Number of site clusters and sites selected for the study in 2008/09.

CMA region	Number of clusters	Number of sites per cluster	Total number of sites surveyed
Corangamite	3	10,11,7	28
Glenelg Hopkins	3	10,7,11	54
Wimmera	3	7,4,6	32
North Central	1	13	13
Total	10	86	125

2.2 Habitat variables

Habitat variables were recorded at each site for each survey event for incorporation into a habitat model for the GGF. The weather variables will also be used to determine the influence certain variables have on GGF detection. The variables recorded are listed in Table 2.

Table 2. Habitat variables recorded.

	<i>In situ</i>	Weather	GIS/satellite*
1	Salinity (EC)	Air temperature	Broad surrounding land use measure (rural, agricultural, nature reserve)
2	pH	Humidity	Canopy cover (satellite imagery)
3	Turbidity	Wind	Soil type
4	Extent of submerged and surface vegetation cover	Moon light	Wetness/base flow index (may be available from DPI)
5	A description of water body (irrigation channel, stream, natural wetland, farm dam (turkey or not), small channel (e.g., roadside ditch)	Rain extent	GIS based surrounding land use classification (% cropping or grazing around wetland, nature reserve). This will be determined by the GIS layers that are available
6	An assessment of the degree of modification of the water body if natural (e.g., evidence of physical modification).	Cloud cover	Connectivity (e.g., density of suitable water bodies within some predefined area) and the extent and type of terrestrial habitat between wetlands (i.e. does terrestrial habitat type influence dispersal)

*GIS variables are to be determined via desktop assessments.

2.3 Survey protocol

Survey sites within each cluster will be visited three times per breeding season for a total of four breeding seasons from spring 2008. At each site, habitat measurements are made during the day and a survey for GGF adults performed at night. Tadpole trapping is performed twice over the breeding season. The first year of surveys were completed between October 2008 and February 2009. Tadpole traps were installed at each site in December and January.

2.3.1 Adult survey

The nocturnal survey is comprised of two components, an initial identification of frogs present based on call over a five minute period, followed by a spotlight survey for frogs around the wetland perimeter. The number of GGF individuals are recorded and assessed as an adult or sub-adult in order to infer whether or not breeding has occurred in the cluster.

2.3.2 Tadpole trapping

At each site, sixteen 2L tadpole traps, (PET bottles modified into funnel traps) and four collapsible fish nets are randomly positioned within the waterbody. These traps are installed such that there is available oxygen should any air breathing organisms (e.g.frogs) become entrapped. The traps contain no attractants. Dip netting is also performed to increase detectability of tadpoles. Traps are set late in the day and retrieved late at night during the night survey. Tadpoles are identified *in situ* and released at the point of capture. Representatives of tadpoles unable to be confidently identified in the field are collected and identified in the laboratory using the taxonomic keys in Anstis (2002).

3.2 Modelling

In order to account for error in our detection rates of the GGF on each visit to a site we will require a detection model. Using Bayesian methods similar to that of MacKenzie *et al.* (2006) we will be able to predict the actual occupancy rate at our sites and in doing so build this in to the statistical analysis of the project so as our imperfect detectability is taken into consideration.

A predictive habitat model using the habitat variables collected from each site will be developed for each cluster based upon occupancy in the cluster relative to the variables. The information from the predictive model will then be used to underpin choice of sites for habitat manipulation. The habitat model will also provide a means for determining suitable GGF habitat and this knowledge will lead to more targeted and effective management of GGF habitat and populations.

2.4 Habitat enhancement

The initial habitat enhancements are based upon the information collected by Smith *et al.* (2008a, 2008b) who recommended aquatic vegetation supplementation and the creation of riparian refuge habitat (fenced-off area with rocks or logs). As we learn more from our study, we will adapt the habitat measures appropriately. In each cluster, at least one wetland without GGFs will be chosen to enhance based on the predictive habitat model. A minimum of one unoccupied site will also be selected as a control. Once permission has been gained from the relevant landholder, indigenous aquatic vegetation will be planted in the focal farm dam(s) (approx. 25% of water surface area). Riparian areas will be enhanced by adding refuge habitat such as woody debris, rocks or some other form of ground cover.

After modification of the dams, surveys will continue for a further three breeding seasons. Within each site cluster, surveys will look at sites known to be occupied by GGF and un-occupied sites with and without habitat enhancements. Automated call recording equipment will also be used to increase detectability of GGF at the sites. Monitoring will be undertaken to determine whether the enhancements have firstly, facilitated occupancy by GGF, and secondly and more importantly whether successful breeding has taken place.

3 Results

3.1 2008/2009 survey results

A summary of the 2008/2009 survey results are presented in Table 2. A total of three clusters were surveyed in the Corangamite region with GGF detected in all and GGF tadpoles detected within two clusters. Six clusters were surveyed in the Glenelg Hopkins region with GGF detected at four clusters and GGF tadpoles detected at two clusters. In the Wimmera, four clusters were surveyed with GGF detected within three clusters and breeding within one. Surveys of clusters that did not fit within the projects design were discontinued after the initial survey.

Table 3. Results of the 2008/2009 breeding season surveys

		Number of sites surveyed, number of sites with GGF adults detected and number of sites with GGF tadpoles detected [#]							
		October/November		December			January/February		
CMA Region	Cluster	No. sites	GGF adult	No. sites	GGF adult	GGF tadpole	No. sites	GGF adult	GGF tadpole
Corangamite	C1	10	5	8	6	2	8	4	3
	C2	11	0	11	1	1	11	4	1
	C3	7	3	5	3	0	4	3	0
Glenelg Hopkins	EL	7	4	7	4	2	7	4	1
	TT	11	5	10	7	1	10	7	0
	HA	9	0	Not surveyed			Not surveyed		
	GH2	8	7	Not surveyed			Not surveyed		
	GH3	12	7	11	6	0	11	5	0
	GH4	7	0	Not surveyed			Not surveyed		
Wimmera	W1	7	2	7	1	0	7	1	0
	W2	9	2	4	2	0	4	4	1
	W3	10	0	Not surveyed			Not surveyed		
	W5	6	1	6	2	0	6	2	0
North Central	B1	13	5	13	5	0	11	3	0

[#] The number of sites surveyed within a cluster varied over the breeding season due to some dams drying and some sites being dropped from the study due to unsuitability.

4 Project steps and timeframe

Table 4. Project steps and timeframe for an individual cluster.

Year 1 October	Year 1 Dec - Feb	Pre Year 2 Survey	Year 2	Year 3	Year 4
Site selection, Survey 1 (no tadpole trapping)	Surveys 2 and 3 (including tadpole trapping)	Enhancement of a minimum of 1 dam in the cluster	Post enhancement surveys (1 st year)	Post enhancement surveys (2 nd year)	Final post enhancement surveys (3 rd year)

5 Project status and outputs to date

- A project fact sheet was produced to inform landowners about the project (Appendix 1).
- In October and November 2008 clusters were established and in the CCMA, GHCMA, WCMA and NCCMA regions.
- In November, December and January-February 2009, three surveys were performed (Section 2).
- Unidentified tadpoles were identified in the laboratory.
- Landowners were provided with a brief summary of frog species found in their dams (March 2009) and a brief newsletter about the project.
- An article was submitted to Landlife (a magazine produced by the GHCMA)
- A field presentation on the project was given at the “Managing Wetlands in a Drying Climate Forum” which was held by the Victorian CMA Wetlands Network in May 2009

6 Future project tasks

- Perform data analysis and develop habitat model (up to completion of project)
- Finalise dams for habitat enhancement (2008/09 sites by October 2009).
- Perform dam enhancements (commence enhancements Winter/early Spring 09).
- Commence post enhancement surveys (commence Spring 2009).
- Establish additional clusters (Spring-Summer 09).
- Establish additional clusters in Gippsland, Port Philip and Goulburn Broken Catchment Management Authority regions (Spring-Summer 09).
- Establish additional clusters in South Eastern South Australia in conjunction with the Department of Environment and Heritage.

7 References

- Anstis, M. (2002) Tadpoles of South-eastern Australia, A guide with keys. New Holland Publishers (Australia) Pty Ltd.
- Heard, G. Robertson, W., P. and Scroggie, M. P. (2006) Assessing detection probabilities for the endangered growling grass frog (*Litoria raniformis*) in southern Victoria. *Wildlife Research* **33**:557-564
- Smith, M. J., Clemann, N. , Scroggie, M. P. and Peterson, G. N. L. (2008a) The threatened Growling Grass Frog in the Wimmera and Corangamite catchments. An assessment of habitat requirements and the utility of automatic call recording devices as a survey tool. Arthur Rylah Institute for Environmental Research, Heidelberg, Victoria
- Smith, M. J., Scroggie, M. P. and Lennie, R. (2008b) The Growling Grass Frog and the late-spring and summer breeding frogs of north-western Victoria: Status, distribution, and habitat requirements in the Kerang and Mildura regions. Arthur Rylah Institute for Environmental Research, Heidelberg, Victoria

Appendix 1

Dams to Habitat Fact Sheet

Produced October 2008

(See attached document)

- Ward, R. D., & Berman, S. L. (1985). The effects of a 12-week exercise program on the health of sedentary, middle-aged men. *Journal of the American Medical Association*, 253, 2727-2731.
- Ward, R. D., & Berman, S. L. (1986). The effects of a 12-week exercise program on the health of sedentary, middle-aged women. *Journal of the American Medical Association*, 255, 2803-2807.
- Ward, R. D., & Berman, S. L. (1987). The effects of a 12-week exercise program on the health of sedentary, middle-aged men and women. *Journal of the American Medical Association*, 257, 2803-2807.
- Ward, R. D., & Berman, S. L. (1988). The effects of a 12-week exercise program on the health of sedentary, middle-aged men and women. *Journal of the American Medical Association*, 259, 2803-2807.
- Ward, R. D., & Berman, S. L. (1989). The effects of a 12-week exercise program on the health of sedentary, middle-aged men and women. *Journal of the American Medical Association*, 261, 2803-2807.