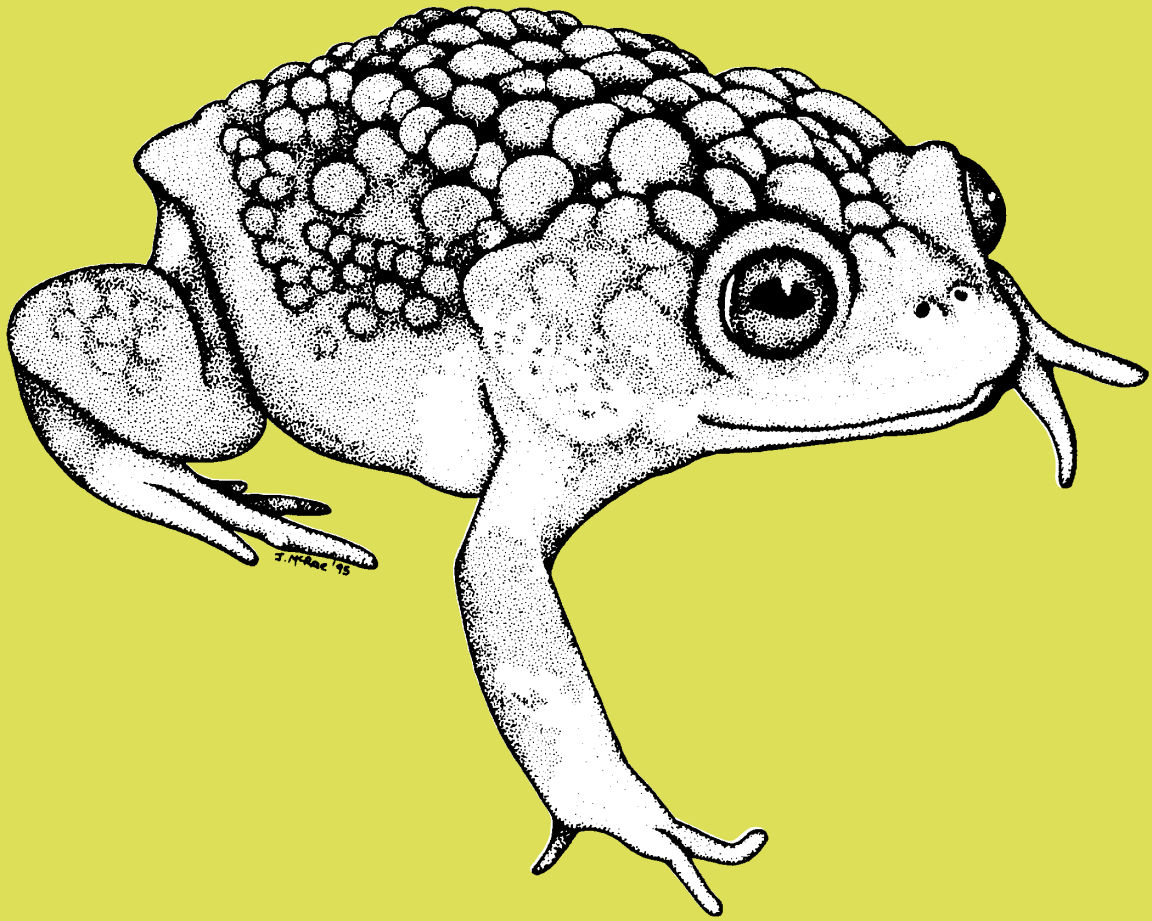
Sunset Frog Recovery Plan

By Andrew A Burbidge and J Dale Roberts



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Wildlife Management Program N0 35

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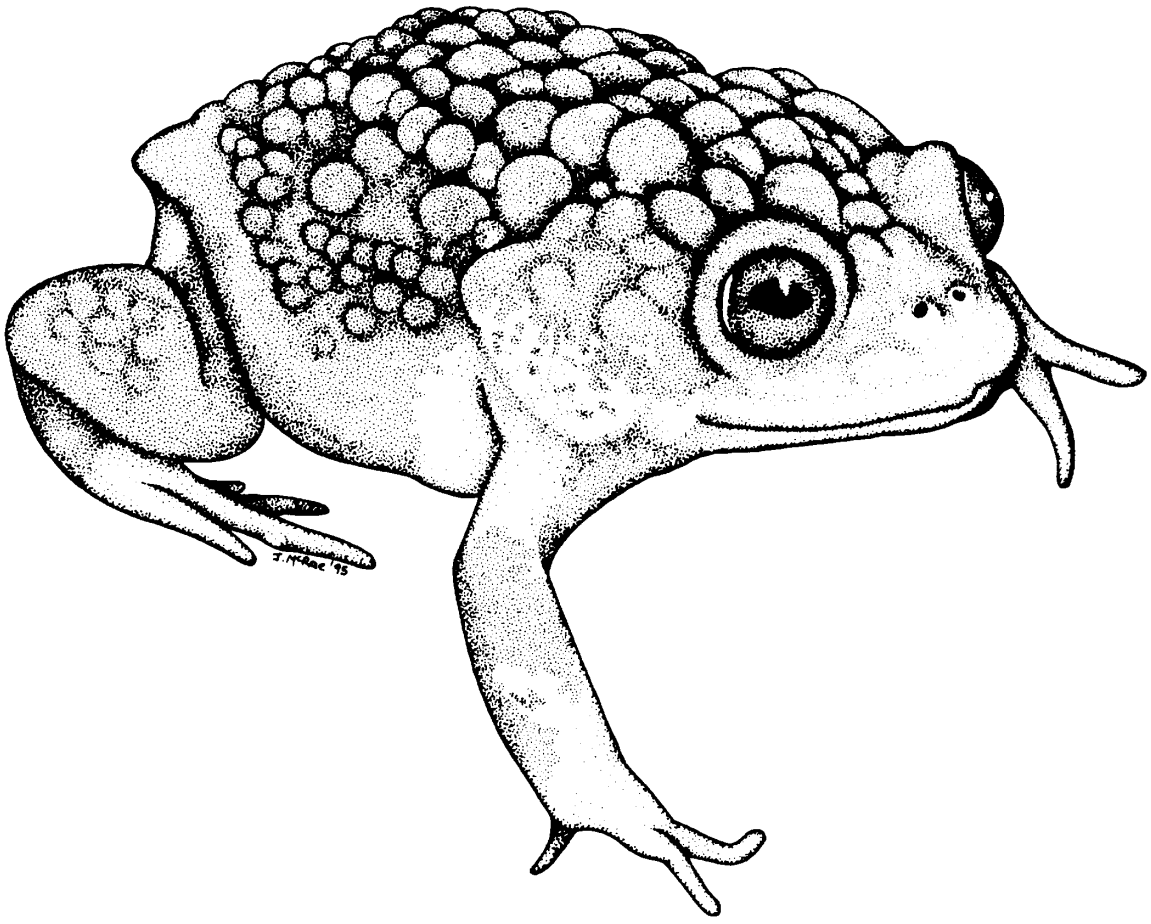

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WILDLIFE MANAGEMENT PROGRAM No. 35

SUNSET FROG RECOVERY PLAN

July 2001 - June 2006

by

Andrew A Burbidge[1] and J Dale Roberts [2]

[1] Western Australian Threatened Species and Communities Unit,
Department of Conservation and Land Management,
PO Box 51, Wanneroo, WA 6946

[2] Department of Zoology,
The University of Western Australia,
35 Stirling Highway, Crawley, WA 6009

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Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit
PO Box 51, Wanneroo, WA 6849

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Western Australian Threatened Species and Communities Unit
PO Box 51 Wanneroo, Western Australia 6849
Telephone +61 8 9405 5128, Fax +61 8 9306 1066

Preparation by: Jill Pryde

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FOREWORD

Recovery Plans (RPs) are developed within the framework laid down in Department of Conservation and Land Management (the Department) Policy Statements Nos 44 and 50.

Recovery Plans delineate, justify and schedule management actions necessary to support the recovery of threatened species and ecological communities. The attainment of objectives and the provision of funds necessary to implement actions is subject to budgetary and other constraints affecting the parties involved, as well as the need to address other priorities. Recovery Plans do not necessarily represent the views or the official position of individuals or organisations represented on the Recovery Team.

This RP was approved by the Department of Conservation and Land Management on 2 March 2001, by the Conservation Commission of Western Australia on 15 June 2001 and by the Minister for the Environment on 2 January 2002. Approved RPs are subject to modification as dictated by new findings, changes in status of the taxon or ecological community and the completion of recovery actions. The provision of funds identified in this Recovery Plan is dependent on budgetary and other constraints affecting the Department and The University of Western Australia, as well as the need to address other priorities.

Approved RPs are subject to modification as dictated by new findings, changes in species' status and completion of Recovery Actions.

Information in this IRP was accurate at January 2001.

CONTENTS

SUMMARY

Spicospina flammocaerulea, Sunset Frog

Family: Myobatrachidae
The Department's Region: Warren
The Department's District: Frankland
Shires: Denmark, with one site in Plantagenet
Recovery Team: Sunset Frog Recovery Team
Current status of taxon: Vulnerable
Habitat requirements: Peat-based swamps in the headwaters of first order streams or perched swamps in areas of diffuse drainage

Recovery criteria:
This Recovery Plan will be deemed successful if:

- less than five populations of *Spicospina* known to exist in January 2001 become locally extinct, and
- the species is found at new locations.

This RP will be deemed a failure if:

- more than four populations of *Spicospina* known to exist in January 2001 become locally extinct within five years, or
- the estimated total number of mature individuals declines by more than 20% within five years.

Recovery Actions:

1. Develop predictive models of calling activity
2. Search for new locations
3. Monitor population size
4. Fire research
5. Habitat management
6. Liaison with private landowners.

Cost: $103,500 over five years

1. BACKGROUND

1.1 History and taxonomy of taxon

The Sunset Frog *Spicospina flammocaerulea* was discovered in 1994. The first specimen was found by Dr Pierre Horwitz of Edith Cowan University, while conducting a survey of freshwater crustaceans in the southern forests of Western Australia. The species was named and described in 1997 (Roberts *et al.* 1997). In the past the species has also been known by the common names 'Mountain Road Frog', 'Mountain Frog' and 'Harlequin Frog'.

Spicospina represents an ancient lineage of frogs in the family Myobatrachidae dating from the early- to mid-Oligocene. Only a single species is known. It is most closely related to the genera *Uperoleia*, found in northern and eastern Australia and *Myobatrachus* and *Metacrinia* found in southwestern Australia. Elements of the ventral colour pattern also occur in *Metacrinia*, and *Spicospina* pushes forward into moss and moveable substrates in a fashion comparable to the forward burrowing of *Myobatrachus*. *Spicospina* shares massive parotid glands with *Uperoleia* (Roberts *et al.* 1997).

The Sunset Frog is a moderate-sized species (females 31-36 mm, males 29.5-34.8 mm snout-vent length) characterised by massive parotid glands, prominent eyes and the colour of the ventral skin—anterior brilliant orange, posterior fine light blue spots on dark grey to black background.

Dr Dale Roberts and colleagues carried out basic research on the species under contract to the Department of Conservation and Land Management (the Department) during 1998, 1999 and 2000. This research was funded jointly by a Natural Heritage Trust grant to the Department (No. 12811), by The University of Western Australia and by the Department. Volunteers from the Walpole - Nornalup National Parks Association assisted with the research.

1.2 Distribution and habitat

The Sunset Frog is restricted to a small area east and northeast of Walpole, near and north of Bow Bridge, Western Australia. All known locations except one are in the Shire of Denmark; the most northerly is in the Shire of Plantagenet. It inhabits peat-based swamps in the headwaters of first order streams or perched swamps in areas of diffuse drainage. Most known sites are in and around the northern and eastern periphery of the distribution of tingle forests. Populations have been found in the Bow River, Kent River and possibly the Frankland River drainages. (The exact location of the most westerly population is uncertain and the swamp may drain either east into the Bow River (most likely) or west into the Frankland River drainage or possibly both ways.)

Twenty-seven possible populations are known with the best increase in population numbers recorded following surveys on nights following heavy rain in 1997 and 2000. The known 'Extent of Occurrence' (see IUCN 1994) of *Spicospina* is now 305 km^2. The 'Area of Occupancy' is estimated to be about 120 ha.

The species is known from a minimum of 24 locations, of which 12 are on private property, and 10 in National Park or State forest proposed for reservation under the Regional Forest Agreement (Government of Western Australia 1999). Two further sites are on water resource development areas (dam sites).

Even though the Area of Occupancy is much less than the IUCN (2000) guideline of 20 km^2 (see below), the delisting of the species could be considered if further populations are discovered and there is no evidence of decline.

1.3 Biology and ecology

Spicospina is a conventional aquatic breeder. Amplexus is inguinal as in other myobatrachids with eggs deposited singly in shallow still and slowly flowing water. Males have been heard calling from September to December but peak activity seems to be in November and early December at most sites. The call, formed of two pulsed notes, is unlike any other species in the subfamily Myobatrachinae and bears no resemblance to any Limnodynastine species in south-western Australia (Roberts *et al.* 1997). Calling males are particularly susceptible to disturbance with resumption of calling taking up to 20 minutes.

The eggs are about the size of eggs *of Crinia georgiana*, which could allow eggs to develop with minimal feeding. Tadpoles reared from eggs had poorly developed mouth parts consistent with that suggestion. Nothing is known of food preferences, predation risk or habitat use outside the breeding season except that frogs were collected in swamp systems in February in 1994. The short limbs, the fact that eggs are deposited in late spring and early summer when down stream drainages are largely dry and the distinct colouration coupled with relatively recent discovery all suggest this species move little outside the swamp habitat.

Marked animals have been recaptured two years after initial marking suggesting this species may have a comparatively long life span and fairly good adult survival. *Crinia georgiana*, a comparable-sized frog, can mature in one year but mark-release-recapture (MRR) data generated only five recaptures of 278 frogs between years (Smith & Roberts unpublished data)—a much lower recapture rate than in *Spicospina*.

1.4 Threatening processes

Although it has been suggested that the species may be detrimentally affected by management practices such as loss or degradation of vegetation due to fire or disease (Roberts *et al.* 1997), recent research suggests that the species is not significantly threatened. For example, *Spicospina* has now been located in several highly-modified swamps in farmland and the species calls more commonly after swamps have been burnt. MRR studies at two sites suggest the breeding population of males is about twice the maximum count of callers. However, considerable variation in levels of calling activity between nights has made it difficult to generate reliable estimates of the number of calling males for many sites.

There is evidence of long term decline in numbers of calling males at one site over seven years post fire, but numbers of callers have been steady or possibly increasing at several other sites. Sites long post-burn may retain large populations if call sites or appropriate micro-climatic conditions are limited with extensive regrowth of vegetation. Integrated across 13 sites from 1997 - 2000 there was no evidence of overall population decline with population size assessed as maximum number of calling males.

Eight localities are within areas that are likely to be flooded or have their surface and groundwater systems significantly altered by the planned Bow River Dam (Regional Forest Agreement for South-west Forest Region of Western Australia, p55: map ID 128, Bow River, 695 ha of State Forest to be re-vested as Crown Reserve for Water Resource Development). The planned Kent River/Styx Dam may likewise affect yet to be found populations at the eastern limits of current known distribution (Regional Forest Agreement for the south-west forest region of Western Australia (RFA) map ID 133) (Government of Western Australia 1999). The proposed dam, should it be constructed, may also impact some of the privately owned sites.

Possible threatening processes include:

- inappropriate fire regimes,
- physical damage to swamps, e.g. breaching of peat,
- damage by feral pigs,

- siltation from poorly-designed or executed road construction,
- loss of swamp vegetation due to dieback resulting in open swamps lacking cover,
- construction of dams and consequent flooding or degradation of habitat,
- impacts of possible mining activity (exploration or development as per Regional Forest Agreement) in State Forest,
- pollution of swamps, eg by chemicals used on farms, and
- collection due to novelty value of colouration and apparent rarity.

1.5 Conservation status

Spicospina flammocaerulea is listed as 'fauna that is rare or likely to become extinct' pursuant to the Western Australian Wildlife Conservation Act 1950. It is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

It has been allocated to the 1994 IUCN Red List Category 'Vulnerable' by the WA Threatened Species Scientific Committee under Criterion D2 (Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km^2) or in the number of locations (typically less than 5). Such a taxon would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming Critically Endangered or even Extinct in a very short period.)

Under the 2000 IUCN Red List criteria, *Spicospina flammocaerulea* is also Vulnerable under Criterion D2 (Population with a very restricted area of occupancy (typically less than 20 km^2) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

In 1997, the species was known only from four localities and had a known Extent of Occurrence of 3.63 km^2. At that time the species was considered to be 'Endangered'. Research carried out since then has shown that there are at least 24 populations and that it occurs over a much wider area. This research also investigated survey methods and the species' biology and ecology.

1.6 Strategy for recovery

The keys to conserving the Sunset Frog are ensuring that known populations persist, and clarifying the species' actual range. This will require monitoring known populations and correlating numbers with any disturbances that occur (eg, fire), as well as searching for new populations, especially outside the current 'Extent of Occurrence'. Active fire research, eg, burning a swamp with a known population size or swamps where there has been an apparent population decline post fire, may assist in defining an appropriate fire regime.

2. CRITICAL HABITAT

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or community. Habitat means the biophysical medium or media: (a) occupied (continuously, periodically or occasionally) by an organism or group of organisms; or (b) once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)).

For the Sunset Frog, the following comprises critical habitat:
- the swamps in which the frog occurs, and
- the catchments of the swamps.

How many swamps are 'critical to the survival' of the Sunset Frog is not known; however, it seems unlikely that the loss of a few populations would cause the extinction of the species.

3. GUIDE FOR DECISION-MAKERS

Possible future actions that may constitute 'significant impact' on the Sunset Frog or its habitat include:

- any action, including changes in land use within catchments, that may affect the quantity or quality of water flowing into swamps utilised by the species, including drainage and land-use in the catchments that caused pollution or eutrophication,
- any process that alters the ability of a peatland to accrue organic material has the potential to alter the habitat quality of the Sunset Frog; this would include the deliberate imposition of an inappropriate fire regime,
- damming of rivers that would cause flooding of habitat or changes to the hydrology of habitat,
- any nearby industrial development that may affect air quality to the extent that rainfall quality changed to the extent that water quality in the swamps was lowered, and
- subdivision of the land near swamps inhabited by the Sunset Frog to urban or near urban levels, thus increasing people pressure on the habitat and leading to increased risk of frequent fire, and increased demand that nuisance insects within the swamps be controlled.

4. RECOVERY AIM AND CRITERIA

4.1 Objective

The Objective of the Sunset Frog Recovery Plan is to conserve known populations of the species and encourage the discovery and conservation of additional populations.

Explanatory note: The Sunset frog currently meets IUCN (1994, 2000) Red List criteria for Vulnerable. It could be considered for delisting if additional populations are located over a wider area. It could become 'Endangered' under IUCN (2000) Criterion C1 if there are less than 2 500 mature individuals and a continuing decline of at least 20% within 5 years or two generations (whichever is the longer). The total known population is estimated to be about 2 100. Population estimates are based on the number of calling males multiplied by 4.2, a figure based on MRR studies, assuming a 1:1 adult sex ratio. Counting calling males is difficult because the Sunset Frog, unlike many other frog species, does not call consistently throughout the breeding season and the numbers of calling males at any one site varies considerably from night to night and year to year.

4.2 Criteria for success

This RP will be deemed successful if:

- less than five populations of *Spicospina* known to exist in January 2001 become locally extinct within five years, and
- the species is found at new locations.

4.3 Criteria for failure

This IRP will be deemed a failure if:

- more than four populations of *Spicospina* known to exist in January 2001 become locally extinct within five years, or
- the estimated total number of mature individuals declines by more than 20% within five years.

5. RECOVERY ACTIONS

A recovery team, the Sunset Frog Recovery Team, will coordinate and oversee actions described below. The Recovery Team currently consists of representatives from the Department (Warren Region/Frankland District and WATSCU), the Zoology Department of The University of Western Australia, and the Walpole / Nornalup National Parks Association.

5.1 Develop predictive models of calling activity

Automated call recording boxes were placed at five sites in 2000. These data should be analysed and used to make a predictive model of calling activity using Walpole climate data and moon phase. This will allow a better focus of any survey work proposed below.

Responsibility: UWA Zoology Department
Cost: $4,000
Priority: Moderate
Completion date: 2001

5.2 Search for new locations

Every time that extensive searches for the Sunset Frog have taken place, additional populations have been located. The area northeast of Walpole includes swamps with poor access (most searching has been along roads and tracks) and it is very likely that the species occurs at additional localities. Advertisement of the distinctive call and appearance through local media outlets and places such as the Department's Offices, the Tree Top Walk and the Denmark Environment Centre may also lead to additional sites being found. Placement of permanent sloping mesh traps in potential swamps may also detect this species and is a low cost trapping method - all work can be done in daylight.

Responsibility: Recovery Team
Cost: The Department $6,500; UWA $1,100; Total $7,600 per year
Priority: Moderate
Completion date: 2006

5.3 Monitor population size

A sample of known locations will be monitored for numbers of calling males during the breeding season, the localities to be determined by the recovery team. Because of the high variability in numbers of calling males during the breeding season, this will optimally be done by mark-release-recapture studies or, minimally by direct counts over ten nights in November including nights with and without rain if possible.

Responsibility: Recovery Team
Cost: The Department $3,000, UWA $4,600. Total $7,600 per year
Priority: Moderate
Completion date: ongoing

5.4 Fire research

Defining an appropriate fire regime is important, especially for public estate, where prescribed fuel reduction burning is currently practiced, but this will be difficult. Available evidence does not suggest that the burning of swamps inhabited by the Sunset Frog is necessarily detrimental. Two new populations were detected by the presence of calling males in Thames Forest Block after low intensity Spring fire in 2000 (both sites that had had several previous visits). Peak counts of calling males were made at two sites immediately after and one year post fire for low and high intensity spring burns respectively. At the high

intensity burn site calling and egg deposition was also detected one month later suggesting this is a sustained, short term response. Longer term, numbers of calling males at that site (Mountain Road) had dropped to zero six years post fire.

Peat-based swamps in first order stream systems will be monitored for frog presence after any burning operation either by direct observation, use of call boxes or by trapping with mesh traps.

To the extent possible, fire histories will be documented for swamps inhabited by the Sunset Frog. Sites with historically known populations could be deliberately burnt to replicate anecdotal evidence of increased numbers of calling males made at Mountain Road and Trent Road #2 in 1994 and 2000. These observations could also be made as part of the burn cycle (section 5.5).

Responsibility:	The Department's Frankland District
Cost:	The Department $2,000 per year; UWA $1000 1st year. Total 2001 $3,000, then $2,000 per year
Priority:	Moderate
Completion date:	2006

5.5 Habitat management

About half of the known sites are in public land managed by the Department as National Park or State forest. These sites require routine conservation management and also special consideration whenever operations, such as road and bridge construction and prescribed burning, take place. The Department will ensure that all known locations are marked on operational maps and that special approvals are required before any operation takes place.

Responsibility:	The Department's Frankland District.
Cost:	The Department $2,000 per year
Priority:	High
Completion date:	ongoing

5.6 Liaison with private landowners

About half the known sites are on private property. Landowners will be advised of the occurrence of the threatened species on their property. The Recovery Team will provide advice to landowners on land management when sought. The possibility of landowners joining 'Land for Wildlife' or covenanting some of their land for nature conservation will be raised with people owning swamps with populations of the Sunset Frog.

Responsibility:	The Department's Frankland District.
Cost:	The Department $500 per year
Priority:	High
Completion date:	ongoing

IMPLEMENTATION TABLE – SUNSET FROG RECOVERY PLAN

Action No	Action	Cost, five years	Responsibility	Completion date
1	Develop predictive models of calling activity	$4,000	UWA Zoology	2001
2	Search for new locations	$38,000	Recovery Team	2006
3	Monitor population size	$38,000	Recovery Team	ongoing
4	Fire research	$11,000	The Department's Frankland District	2006
5	Habitat management	$10,000	The Department's Frankland District	ongoing
6	Liaison with private landowners	$2,500	The Department's Frankland District	ongoing
	Total cost, five years	**$103,500**		

ACKNOWLEDGEMENTS

Rob Davis and Michelle Drew helped with fieldwork and Michael Smith with design and installation of call boxes. Karlene Bain assisted with call box maintenance. Greg Freebury helped researchers with accommodation and permits, and provided information for this recovery plan. Roger Hearn advised on costs and possible effects of dams and mining as provided in the RFA, and Peter Orell prepared the distribution map.

Research work leading to the development of this Recovery Plan was supported by the Natural Heritage Trust.

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