

Recovery plan for the stream-dwelling rainforest frogs of the Eungella region of mid-eastern Queensland 2000–2004

Prepared by the Northern Queensland Threatened Frogs Recovery Team



Taudactylus eungellensis Eungella dayfrog



Rheobatrachus vitellinus Northern platypusfrog

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Summary

This document is a five year plan for the recovery of two endangered frogs, *Rheobatrachus vitellinus* and *Taudactylus eungellensis*, species restricted to the Clarke Range west of Mackay, mid-eastern Queensland. Both species have undergone range contractions, with dramatic population declines in all known populations. *Rheobatrachus vitellinus* has not been sighted since March 1985. *Taudactylus eungellensis* has since been detected in five catchments which drain the slopes of Mt Dalrymple.

The recovery plan details current knowledge of the species, possible threats to them and proposed management actions. Implementation of the plan involves the co-operative efforts of community groups, land managers and funding agencies.

The plan is to be reviewed by the Northern Queensland Threatened Frogs Recovery Team and two independent reviewers at the end of its third year.

Habitat requirements and limiting factors

Habitat is restricted to perennial rainforest streams of Eungella National Park and adjacent state forests.

The major threatening processes have not yet been identified, despite documentation of population declines. The chytrid fungus has yet to be identified in Clarke Range stream-dwelling frogs. Investigation of the occurrence of this disease in *T. eungellensis* and *R. vitellinus* is an action in this plan. If it occurs it may be a significant threatening process leading to species declines. A potential threat could arise from the extraction and/or the impoundment of water from the perennial streams where these frogs have been located, especially in state forests.

Recovery plan objectives

Overall objectives:

To significantly improve the conservation and long term survival of *T. eungellensis* and to verify the continued existence of *R. vitellinus*.

Specific objectives:

1. To search intensively for *R. vitellinus*.
2. To identify, and reduce or eliminate the major threatening process(es).
3. To increase the number of stable populations of *T. eungellensis* by promoting expansion into their former ranges.
4. To ensure that frog conservation is incorporated into all appropriate land management decisions by raising the awareness of the declining frog problem within all levels of government and the general community.

Performance criteria

1. Exhaustive searches are carried out to locate populations of *R. vitellinus* in areas of its former range.
2. If populations of *R. vitellinus* are located, population densities remain at or increase above the levels at which originally detected.
3. Population densities of *T. eungellensis* remain at or increase above current levels at selected monitoring sites.
4. The major threatening process(es) are identified.
5. Strategies for the reduction of threatening processes are developed and implemented.

6. Improved communication occurs between researchers, planners and land managers through workshops and networking.
7. Increased information is provided to the public through the Eungella declining frog brochure, the appropriate web pages in the Environmental Protection Agency and Environment Australia web sites, articles in the media and newsletters, and community participation in frog monitoring programs.

Actions

1. Population monitoring and assessment.
2. Disease investigations.
3. Population management
4. Public information, community participation and consultation.

Introduction

Location and species

The region covered by this recovery plan is centred on the Clarke Range, principally Eungella National Park and adjoining state forests, within the Central Queensland Coast biogeographic region (McDonald and Alford 1999). The two threatened species of frog, *Rheobatrachus vitellinus* and *Taudactylus eungellensis*, are listed as endangered in the Queensland *Nature Conservation (Wildlife) Regulation 1994*. *Rheobatrachus vitellinus* is listed as extinct, and *Taudactylus eungellensis* as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. In 1999 both were listed by the Australian and New Zealand Environment and Conservation Council (ANZECC) in the ANZECC list of threatened Australian fauna.

Both species have undergone range contractions, with dramatic population declines in all known populations. *Rheobatrachus vitellinus* has not been sighted since March 1985. *Taudactylus eungellensis* was not sighted between 1987 and 1992, but small populations have since been detected in five catchments which drain the slopes of Mt Dalrymple (McDonald and Alford 1999, R. Retallick pers. comm.).

Recovery team

The Northern Queensland Threatened Frogs Recovery Team (Appendix 1) is responsible for drafting this recovery plan. Executive responsibility for this plan has been provided to K.R. McDonald, the recovery team co-ordinator. Local input has been obtained from the Queensland Parks and Wildlife Service staff in Mackay District Office and the Central Regional Office in Rockhampton.

The Northern Queensland Threatened Frogs Recovery Team is responsible for the implementation and evaluation of this recovery plan. Progress in implementing the actions of this plan will be reviewed each year, and copies of all reports arising from implementation of the actions should be forwarded to the recovery team. Where necessary, this plan will be modified by the recovery team to include new information.

Stakeholders affected by the plan

The land tenures on which the two frog species have been located are Eungella National Park and Cathu, Pelion and Eungella State Forests. Managers of these tenures are the

Queensland Parks and Wildlife Service (national park) and the Department of Natural Resources (Forestry) (state forests).

Other plans affected

This recovery plan will be influenced by the Queensland National Parks Master Plan which is currently under development. The Master Plan stresses that conservation of natural and cultural resources is the highest priority in park management, and sets guiding principles for the maintenance of natural integrity. Through the Master Plan, this recovery plan will be linked to a state-wide planning process incorporating strategic plans and policies for threatened flora and fauna.

The Pioneer River catchment rises in the Clarke Range mostly within the distribution area of the two threatened frogs. Any water impoundment or extraction activities in the upper catchment of the Pioneer River could have impacts on the stream habitat of the frogs. Any proposed Water Allocation Management Plan will need to include potential threats to the frogs.

As logging of rainforest has ceased in the state forests of the Clarke Range, streams should be free from future logging impacts.

Additional benefits

Frogs are excellent indicators of environmental disturbance as they take in moisture through the skin and are sensitive to any subtle changes in temperature, moisture and water quality.

All the threatened frogs' habitat is within national park or state forest. State forests with suitable rainforest habitat are not subject to logging but streams within them could be subject to future water infrastructure development. Information provided in this recovery plan will be pertinent to all future water infrastructure development within or upstream of the frogs' distribution area.

Within the frogs' distribution area there are three species of threatened flora and an additional three species of fauna most of which occur in open forests and do not occur in the same habitat as the frogs. It is not anticipated that actions taken through the implementation of this recovery plan will have any impact on these species. Maintenance of undisturbed rainforest will contribute to the conservation of other species within the national park and state forests.

Habitat critical to survival

Habitat critical to survival for *R. vitellinus* and *T. eungellensis* is restricted to perennial rainforest streams of Eungella National Park and adjacent state forests.

R. vitellinus has only been recorded in Eungella National Park and Pelion State Forest (Appendix 2). *R. vitellinus* is an aquatic species, confined to shallow, rocky, broken water areas in cascades, riffles, and trickles of fast flowing perennial streams in rainforest above 400 metres altitude. During rain, individuals are frequently observed on exposed rocks in and adjacent to streams (McDonald 1990).

The distribution of *T. eungellensis* is within Eungella National park, Cathu State Forest and Eungella State Forest (McDonald 1990). *T. eungellensis* inhabits exposed rocky sections in

the splash zones of riffles, cascades and waterfalls of rainforest streams. The frog may be found under rocks and crevices or in more exposed positions (Liem and Hosmer 1973, McDonald 1990, McNellie and Hero 1994, Retallick and Hero 1998).

Threats

The major threatening processes to *R. vitellinus* and *T. eungellensis* have not yet been identified, despite documentation of population declines (McDonald 1990). This recovery plan aims to explain these threatening processes.

The chytrid fungus has been identified in sick, dying and dead frogs in the Wet Tropics but has yet to be identified in Clarke Range stream-dwelling frogs. Investigation of the occurrence of this disease in *T. eungellensis* and *R. vitellinus* is an action under this plan. If it occurs it may be a significant threatening process leading to species declines.

A potential threat could arise from the extraction and/or the impoundment of water from the perennial streams where these frogs have been located, especially in state forests. Involvement in any Pioneer River catchment plan through the Queensland Parks and Wildlife Service representative and community groups will be necessary to identify potential impacts on the frog habitat.

Distribution

The distribution of the threatened frogs has been documented, and declines and disappearances have occurred throughout the distribution of both species (McDonald 1990, Appendix 2).

The entire distribution of *T. eungellensis* is protected within natural resource reserves, with 85.7 percent of known sites located within national parks, and 14.3 percent within forestry reserves. However, presence within a reserve has not prevented the catastrophic population decline of this species (Appendix 2).

R. vitellinus was found exclusively in undisturbed rainforest in Eungella National Park and Pelion State Forest at altitudes of 400 to 1000 metres. Records occur between 21° 00'S, 148° 35'E and 21° 04'S, 148° 41'E in the Clarke Range, mid-east Queensland (Covacevich and McDonald 1993, McDonald 1990; see Appendix 2).

Recovery objectives and timelines

Based on the conservation status categories in the *Environment Protection and Biodiversity Conservation Act 1999* the overall recovery plan objective is:

To significantly improve the conservation and long term survival of *T. eungellensis* and to verify the continued existence of *R. vitellinus*.

These objectives will be reviewed in 2004 and modified in the revised recovery plan, based on current information. This will be achieved through the following specific objectives:

1. To search intensively for *R. vitellinus*.

2. To identify, and reduce or eliminate the major threatening process(es).
3. To increase the number of stable populations of *T. eungellensis* by promoting expansion into their former ranges.
4. To ensure that frog conservation is incorporated into all appropriate land management decisions by raising the awareness of the declining frog problem within all levels of government and the general community.

Performance criteria

The criteria for achieving these objectives will be:

1. Exhaustive searches are carried out to locate populations of *R. vitellinus* in areas of its former range.
2. If populations of *R. vitellinus* are located, population densities remain at or increase above the levels at which originally detected.
3. Population densities of *T. eungellensis* remain at or increase above current levels at selected monitoring sites.
4. The major threatening process(es) are identified.
5. Strategies for the reduction of threatening processes are developed and implemented.
6. Improved communication occurs between researchers, planners and land managers through workshops and networking.
7. Increased information is provided to the public through the Eungella declining frog brochure, the appropriate web pages in the Environmental Protection Agency and Environment Australia web sites, articles in the media and newsletters, and community participation in frog monitoring programs.

Actions

Proposed actions, subject to funding and staffing, are listed under the following headings:

1. Population monitoring and assessment.
2. Disease investigations.
3. Population management
4. Public Information, community participation and consultation.

Population monitoring and assessment

Long-term intensive population monitoring

To determine if *T. eungellensis* population densities remain within or above the current range it is necessary to continue long-term monitoring of known populations. This will require frog and tadpole population monitoring by experts at least annually during the peak breeding period of January to April along fixed transects established in 1994/95.

Extensive monitoring to determine population recovery

In order to detect any populations of the threatened frogs, *T. eungellensis* and *R. vitellinus* within their former range, annual searches along streams with suitable habitat are required during the peak breeding season. These searches will consist of presence-absence surveys along streams at a range of altitudes and will include searching historical sites for recolonising frogs.

Should re-colonising populations be discovered, these will then warrant more intensive monitoring. Where possible, regular monitoring by park staff and community volunteers will be implemented at sites which have been historically assessed using standardised techniques.

Population management.

It is intended that the Eungella frog conservation program will complement the more intensive program under way in the wet tropics for the conservation of a group of frogs that apparently face similar threats (*Recovery Plan for the stream-dwelling rainforest frogs of the wet tropics biogeographic region of north-east Queensland 2000-2004*). At this stage it is proposed that management of frog populations at Eungella will be based on recommendations developed from the intensive research program carried out in the wet tropics. Protocols developed in the wet tropics for the reduction of threatening processes and enhancement of frog populations will be applied at Eungella where applicable.

Disease investigations

A major investigation into diseases of Australian frogs and their role in amphibian declines is currently being co-ordinated by Professor Rick Speare at James Cook University, with funding support from the Natural Heritage Trust. Protocols, results and reporting are provided on the frog diseases web site (<http://www.jcu.edu.au/school/phtm/PHTM/frogs>).

The monitoring and search program on the Clarke Range can contribute to the disease investigations by providing information on sick and dying frogs encountered. Dead or ill individuals of *T. eungellensis* found during surveys or other activities will be forwarded to Professor Rick Speare at James Cook University for examination. This material will be included in the frog disease research being undertaken through recovery plans for Australian frogs.

As part of the disease study, investigators will attempt to determine if the pathogen is endemic or epidemic, and conduct a survey of Museum specimens collected at historical sites at Eungella prior to the population declines. Diagnostic tests and histopathology will be used to identify the chytrid fungus (Berger et al 1999). In addition, toe clips will be used to identify the current presence and distribution of the fungus, and to determine whether the pathogen still persists in surviving frog species in the area, or in other organisms from survey sites from which population declines have been recorded. Sampling in the field will be conducted in accordance with approved protocols for frog monitoring outlined in the disease web page.

Public information, community participation and consultation

Dissemination of information

It is important to provide information on declining frog populations to various stakeholders including conservation agencies, state government departments, conservation and community groups, relevant industry groups, local authorities, Aboriginal communities and the general public. To date, this has been achieved through the preparation and distribution of a brochure on declining frog populations and the recovery plan to a range of groups in the Eungella/Mackay region. In addition, a series of workshops will be conducted to ensure that land managers and management planners recognise the importance of the frog fauna and their population declines. Every effort will be made to promote the importance of the frog population declines and the recovery plan through the local, state and national media by publication of articles in the popular press (i.e. Australian Geographic, Nature Australia, Wildlife Australia, etc.). This will increase community awareness of the importance of frogs in general, and the population decline and disappearances of these species in particular.

Community participation

Local community participation in the monitoring of frog populations will be encouraged. Programs such as NatureSearch provide a pool of trained community volunteers able to assist scientific officers and land managers in the field. This will aid the dissemination of information, and significantly increase the number of people capable of identifying the species of concern, thereby increasing the likelihood of additional populations being located.

National park and state forest staff participation is essential. Training of park and state forest rangers to participate in frog monitoring and searches in conjunction with the public is necessary for threatened species management on reserves. While training workshops at monitoring sites in Eungella National Park were conducted in late 1998, regional staff working with NatureSearch co-ordinators have taken on frog monitoring tasks including public participation within the program.

Guide for decision makers

Consultation with all relevant managers of Crown lands is required in order to develop appropriate ways of using natural resources while protecting populations of the endangered frogs. For activities within the distribution of the threatened frogs the following is necessary:

- Any management action must comply with state and federal legislation, especially in relation to threatened species.
- Environmental impact assessments must be conducted before the approval of any management activity which could adversely affect populations of the endangered frogs on national park and state forest.
- Water extraction and impoundment would have significant impacts on the threatened frogs. Before any impoundment or removal of water, impacts on frog populations must be assessed. Particular attention will be given to the removal or impoundment of water adjacent to park boundaries as this may affect frog stream habitat.
- Excessive nature-based activities (e.g. ecotourism) could have significant impacts on stream environments through increases in trampling and human waste. Waste must be removed from the area. Bushwalkers and campers must be required to remove all rubbish, and the code of conduct for bushwalking and camping enacted by community groups and enforced by park staff.
- Habitat disturbance and siltation of streams especially with park and state forest infrastructure should be minimised and must not take place in threatened frog habitat. Should activities proceed they are to be subject to an environmental impact assessment before commencement, and formal rigorous monitoring of the impact after construction.

Tools to assist implementation

Monitoring and assessments

Monitoring known populations of *T. eungellensis* and monitoring at historical sites is required. A standardised proforma is to be used and data will be incorporated into an existing database.

Intensive population monitoring

Two populations will be visited six times a year by park rangers and volunteers.

Historical sites

These sites will be visited twice a year. These are sites that have either had populations of threatened frogs or have small populations of *T. eungellensis*.

Other surveys

Searches for additional populations of *T. eungellensis* and any populations of *R. vitellinus* will be conducted in the August to April period when detection is most likely. A one page proforma for presence and absence will be produced for participants to complete. Several catchments will be surveyed for frogs, either through a yearly search or when bushwalkers are in catchments.

Annual costs:

Operational costs	\$8,000
Labour	\$9,000
Administration costs	\$2,500
Volunteer 'in kind labour'	\$15,000
Total	\$33,500

Population management.

A program of work will depend on recommendations developed from the wet tropics frog recovery program. No costs are estimated at this stage pending the outcome of research results from the wet tropics program.

Disease investigation

Sick and dying frogs will be sent to Professor Rick Speare for analysis. Costs of transport will be born as an internal cost to QPWS.

Annual costs

Collection and transport of specimens: \$500

Community participation

A community group will be formed to help co-ordinate public activities associated with the Eungella threatened frogs. A liaison officer from QPWS will participate as the Departmental representative, and will provide a link with NatureSearch. Funds will need to be secured for co-ordination of the group. It is anticipated that this group would form the nucleus of a recovery team for the Clarke Range threatened frogs. Prior to establishment of this team the co-ordination of the recovery process will be through the northern frog recovery team.

Annual costs

Participation in recovery team meetings: \$1000

Public information

Communication of results and information on frogs will be transmitted through an annual report on activities and results, and by two six-monthly newsletters. In addition, information will be provided to the general public through the electronic and print media.

A brochure and poster on the threatened frogs of the Clarke Range have already been produced. These can be provided to community groups for dissemination.

A leaflet will be produced for nature-based activities in the national park outlining a code of conduct aimed at reducing potential impacts on streams.

Costs

Production of leaflet and printing (year 1): \$3000

Cost schedule (\$)

Action	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Monitoring and assessment	33,500	33,500	33,500	33,500	33,500	167,500
Disease investigation	500	500	500	500	500	2,500
Public information and community participation	4,000	1,000	1,000	1,000	1,000	8,000
Total	38,000	35,000	35,000	35,000	35,000	\$178,000

Monitoring reporting and review

A detailed yearly report with information on monitoring outcomes and community participation as well as additional information from other activities will be provided to participants. This can be linked with two newsletters which will come out in April and October each year.

The North Queensland Threatened Frog Recovery Team will monitor the progress of the recovery plan and provide initial guidance until a community led recovery team for the threatened frogs of the Clarke Range is established.

This recovery plan will be reviewed after three years and modified where necessary with a revision to be written after five years, or earlier if new information warrants major changes.

Regulations

The following table provides requirements for Section 270 (2) of the *Environment Protection and Biodiversity Conservation Act 1999*.

Requirement	Addressed in plan at
(a) Objectives to be achieved	Page 7
(b) Criteria for measuring achievement of the objectives	Page 8
(c) Actions needed to meet the objectives	Page 8
(d) Threats to the species or community	Page 7
(e) Habitat critical to survival	Page 6
(f) Populations that are under particular pressure and the actions needed to protect them	Page 7
(g) Estimated duration and cost of the recovery process	Page 11-12
(h) Interests affected by the plan's implementation and organisations or persons that will be involved in evaluating the plan's performance	Page 9-10
(i) Major benefits to other native species or communities	Page 6

In addition to the above content, regulations accompanying the Act set out the following requirements for making recovery plans.

Requirement	Addressed in plan at
(j) Provide a short description and a 1:25,000 scale map(s) of: <ul style="list-style-type: none"> the location of the listed species and/or communities covered Areas of habitat critical to survival Important populations Any areas that should be reserved from any development action. 	Appendix 2
(k) Identify actions required to reduce threatening processes.	Pages 8-10
(l) Provide guidance on environmental impact assessment matters, including a description of any actions that would be likely to have a significant impact on the listed species and/or communities covered.	Pages 10
(m) Describe proposed incentives for encouraging participation and co-operation by private landholders (where the species and/or communities covered occur on private land).	N/A
(n) Identify the mechanisms for encouraging community participation in the recovery process.	Page 11-12
(o) When identifying the habitats that are critical to the survival of the species or community concerned and the actions needed to protect those habitats (270(2)(d)), recovery plans should apply the criteria for identification of habitats critical to survival established by regulations under section 207A.	Appendix 2 Page 6

Acknowledgements

The Recovery Team thanks Liz Dovey and Brigitta Wimmer (Environment Australia) for assistance and advice in preparing this Recovery Plan. Richard Retallick (JCU) provided unpublished information from his PhD thesis on the ecology of *Taudactylus eungellensis*.

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Appendix 1

Northern Queensland Threatened Frogs Recovery Team

Members as of April 2000

Keith McDonald	Queensland Parks and Wildlife Service
Ross Alford	James Cook University
Tadd Bartareau	Department of Natural Resources (Water Resources)
Derek Ball	Queensland Parks and Wildlife Service
Steve Goosem	Wet Tropics Management Authority
Elanoir Duigan	Community Groups
Ellen Weber	Conservation Groups
Nicola Wright	Waterwatch Program
Brigitta Wimmer	Environment Australia
Andrew Millerd	Department of Natural Resources (Forestry)

Appendix 2

Species profiles

***Rheobatrachus vitellinus* Mahony, Tyler and Davies, 1984.**

Northern platypusfrog, northern gastric-brooding frog, Eungella gastric-brooding frog, or stream frog.

Description of species

A moderately large (males 55.7–58mm, females 62.2–83mm in length), squat frog, with a blunt, rounded snout, with the nostrils directed upwards. The dorsal surface is pale brown with obscure darker patches on the body and limbs. The ventral surface may be white or brown, with bright yellow-orange on the lower abdomen and undersides of the limbs. The skin is granular above, with large projections on the upper eyelid. The ventral surface is smooth. The fingers lack webbing, and the toes are fully webbed. The fingers and toes have slightly expanded tips. Males develop spinulated, unpigmented, nuptial pads on the first finger. The hind legs are short. The tympanum is not visible externally (Cogger 1994, Mahony *et al.* 1984).

The call consists of several loud staccato notes repeated in a long series (McDonald unpubl.).

The tadpole has not been described but material collected in 1985 was unpigmented and had no mouth parts (McDonald unpubl.). Tadpoles of this species develop within the stomach of the mother (Leong *et al.* 1986, McDonald and Tyler 1984).

Distribution

R. vitellinus was found exclusively in undisturbed rainforest in Eungella National Park at altitudes of 400–1000m. Records occur between 21° 00'S, 148° 35'E and 21° 04'S, 148° 41'E in the Clarke Range, mid-east Queensland (Covacevich and McDonald 1993, McDonald 1990; see Figure 1).

R. vitellinus has undergone a sudden range contraction, and has not been located in the wild since March 1985 (see Figure 1).

Habitat

R. vitellinus is an aquatic species, confined to shallow, rocky, broken water areas in cascades, riffles, and trickles of fast flowing perennial streams in rainforest above 400m altitude. During rain, individuals were frequently observed on exposed rocks in and adjacent to the stream (McDonald 1990).

Life history/Ecology

R. vitellinus is largely nocturnal. Males were heard calling at night from September to December, and females were ready to give birth in January to February (Winter and McDonald 1986). It is assumed that fertilised eggs or embryonic tadpoles are swallowed by the female, the tadpoles then completing their development in their mother's stomach. The fully formed metamorphs are later regurgitated from the female's mouth. In the only documented case, 22 metamorphs were brooded (McDonald and Tyler 1984). The morphological and physiological changes which female *R. vitellinus* undergo differ from the only other gastric brooding frog, *R. silus* (Leong *et al.* 1986).

R. vitellinus is both an aquatic and stream edge feeder, its diet includes small crayfish, caddis-fly larvae, terrestrial and aquatic beetles, and even *Taudactylus eungellensis* frogs (Winter and McDonald 1986).

Conservation Status

R. vitellinus was discovered in January 1984, and a monitoring program was immediately instituted by the Queensland Parks and Wildlife Service to determine if this species was susceptible to a population decline such as the one which had led to the disappearance of its relative, *R. silus*. They found that *R. vitellinus* was quite common across the range, with up to six frogs in a 2 x 5m riffle (McDonald 1990). No individuals of *R. vitellinus* could be located at a site on the edge of the distribution in January 1985, although it was still present at other sites (Winter and McDonald 1986, McDonald 1990). *R. vitellinus* has not been recorded from any site since March 1985, despite continued efforts to locate it (Ingram and McDonald 1993, McNellie and Hero 1994, R. Retallick and J.M. Hero pers. comm., A. Freeman pers. comm.).

The conservation status of *R. vitellinus* has been defined as "Critical, possibly Extinct" (Ingram and McDonald 1993) and "Endangered, possibly Extinct" following Thomas and McDonald, 1989 (Covacevich and McDonald 1993, McDonald *et al.* 1991). The Action Plan for Australian Frogs lists *R. vitellinus* as "Endangered" (Tyler 1997). *Rheobatrachus vitellinus* is listed as "Endangered" in the Queensland *Nature Conservation (Wildlife) Regulation 1994* and listed as "Extinct" in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and by ANZECC in 1999.

This species is restricted to a range of less than 50km² in the Clarke Range, but is considered to be well protected (Covacevich and McDonald 1993), as most of its range is within Eungella National Park. The fact that this species was well protected throughout its range has not guaranteed its persistence or survival (Covacevich and McDonald 1993).

The causes of the population decline remain unknown. McDonald (1990) found no obvious evidence that seasonal rarity, over-collecting, drought, floods, habitat destruction, disease, heavy parasite loads or stress due to handling or data collection were responsible for the population declines.

In view of the dramatic population decline of this species, it must be feared that it is close to extinction or is already extinct.

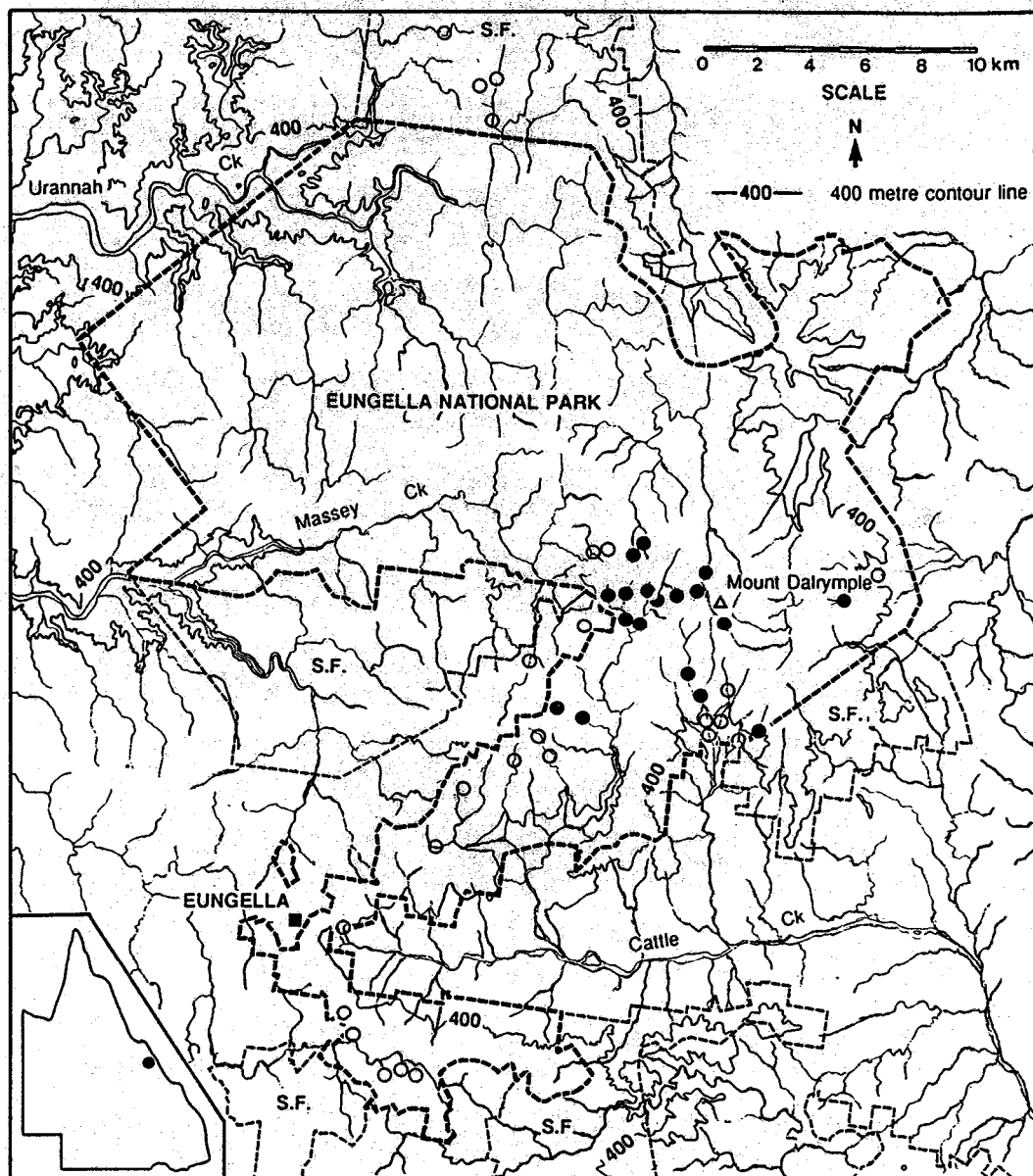


Fig. 1. Distribution of *Rheobatrachus vitellinus* in Eungella National Park to January 1985. Closed circles indicate sites at which frogs were located; open circles indicate sites searched, but in which frogs were not found. Triangle indicates Mt Dalrymple. S.F. = State Forest.

***Taudactylus eungellensis* Liem and Hosmer, 1973.**

Eungella dayfrog, Eungella torrent frog.

Description of species

A small frog, males 25–28mm, females 27.6–35.9mm in length, with a bluntly acuminate snout. The dorsal surface ranges from yellowish tan to dark brown, with irregular dark brown markings. A broad band crosses the head between the eyes, with two other bands anterior to this. A dark band runs from behind the eye to the base of the forearm, and there is an irregular X-shaped marking on the back. There are crossbands on the limbs and digits. The throat and abdomen are cream coloured, and the ventral surfaces of the limbs are cream with or without dark brown spots. The skin is shagreened with tubercles above, the postero-medial portion of the thighs is granular, and the ventral surface is smooth. The fingers and toes have expanded tips, and are broadly fringed but lack webbing. Males have greyish, finely spinulated, rounded nuptial pads resembling a blister on the back of the hand at the base of the second and third fingers. Males do not possess a vocal sac. The tympanum is hidden (Liem and Hosmer 1973).

The call is a gentle rattling sound (McDonald pers. obs.), barely audible over the sound of rushing water (Winter and McDonald 1986).

The tadpole is light to dark brown, orange-brown laterally, with a prominent V-shaped marking on the dorsal surface. The body is oval and the fins narrow, with a rounded tail tip. The spiracle is sinistral. The vent is dextral. The oral disc is umbrella shaped and completely surrounded by marginal papillae. Tooth rows are absent, although there are distinct papillar ridges on the lower labium (Liem and Hosmer 1986, Retallick and Hero 1998).

Distribution

T. eungellensis is restricted to undisturbed rainforest in Eungella National Park (and possibly Cathu, Crediton, Pelion, Eungella State Forests) at altitudes of 200–1000m. Records occur between 20° 50'S, 148° 29'E and 21° 11'S, 148° 42'E in the Clarke Range, mid-east Queensland (Covacevich and McDonald 1993; see Figure 2).

T. eungellensis has undergone a rapid range contraction, and after a period of apparent absence, has now been located at nine sites within its former distribution (McNellie and Hero 1994, Retallick et al. 1997). Currently it is known from Finch Hatton Creek, Boulder, St Helens, Owens, and Cattle Creek catchments which feed into the Pioneer River.

Habitat

T. eungellensis inhabits rocky sections in the splash zones of riffles, cascades and waterfalls of rainforest streams. Frogs may be found under rocks and crevices or in more exposed positions (Liem and Hosmer 1973, McDonald 1990, McNellie and Hero 1994).

The tadpoles are bottom dwellers in pools of rainforest streams, but are not found in riffles or fast flowing water (Retallick and Hero 1998).

Life history/Ecology

T. eungellensis is largely diurnal, although males will call early evening and day (McDonald 1990, McNellie and Hero 1994). They bask on exposed rocks, and when disturbed escape into the water, remaining submerged on the bottom for some time (Couper 1992, Liem and Hosmer 1973). The male has a soft call, but has been observed communicating by visual

cues, which include flicking and waving legs, head bobbing, and distinctive hops (Winter and McDonald 1986).

T. eungellensis is a late summer/autumn breeder with calling occurring all year except June (Liem and Hosmer 1973, McDonald 1990, Retallick et al. 1997). Females lay 30–50 large (2.2–2.6 mm) eggs under rocks in the water (Liem and Hosmer 1973). The tadpoles may overwinter (McDonald 1990).

Conservation Status

T. eungellensis is one of two species of frogs occurring in upland rainforest streams which have undergone substantial population decline in mid-east Queensland (McDonald 1990, Ingram and McDonald 1993).

Before it declined, the species was considered common across its range, occurring in large numbers (up to ten per square metre) over long stretches of streams at high and low altitudes (McDonald 1990, M. Mahony pers. comm.). *T. eungellensis* disappeared from lower altitudes in January 1985, and by June 1986, adults could not be found despite repeated visits to monitored sites (Winter and McDonald 1986). Tadpoles could still be found in the southern parts of its distribution until May 1987 (McDonald 1990). Periodic searches continued unsuccessfully until July 1992, when an adult was caught and photographed at a site where the species had been collected in the past (Couper 1992). Subsequent searches between November 1993 and the present have located adults, subadults, metamorphs or tadpoles at nine sites within catchments from which they had been historically recorded in Eungella National Park (McNellie and Hero 1994, R. Retallick and J.M. Hero pers. comm.; Retallick, et al. 1997).

The conservation status of *T. eungellensis* has been defined as “Critically endangered” (Ingram and McDonald 1993) and “Endangered” following Thomas and McDonald, 1989 (Covacevich and McDonald 1993, McDonald et al. 1991). The Action Plan for Australian Frogs lists *T. eungellensis* as “Endangered” (Tyler 1997). *Taudactylus eungellensis* is listed as “Endangered” in the Queensland *Nature Conservation (Wildlife) Regulation 1994* and as “Endangered” in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and critically endangered by ANZECC in 1999.

This species was restricted to a range of less than 200km², but was considered well protected (Covacevich and McDonald 1993), as most of that range was within Eungella National Park, Cathu State Forest and Eungella State Forest. The fact that this species was well protected throughout its range within several conservation reserves has not guaranteed its survival in all areas (Covacevich and McDonald 1993).

The causes of the population decline remain unknown. McDonald (1990) found no obvious evidence that seasonal rarity, over-collecting, drought, floods, habitat destruction, disease, heavy parasite loads or stress due to handling and data collection were responsible for the population declines.

In view of the dramatic population decline of this narrowly endemic species, it must be feared that it is close to extinction.

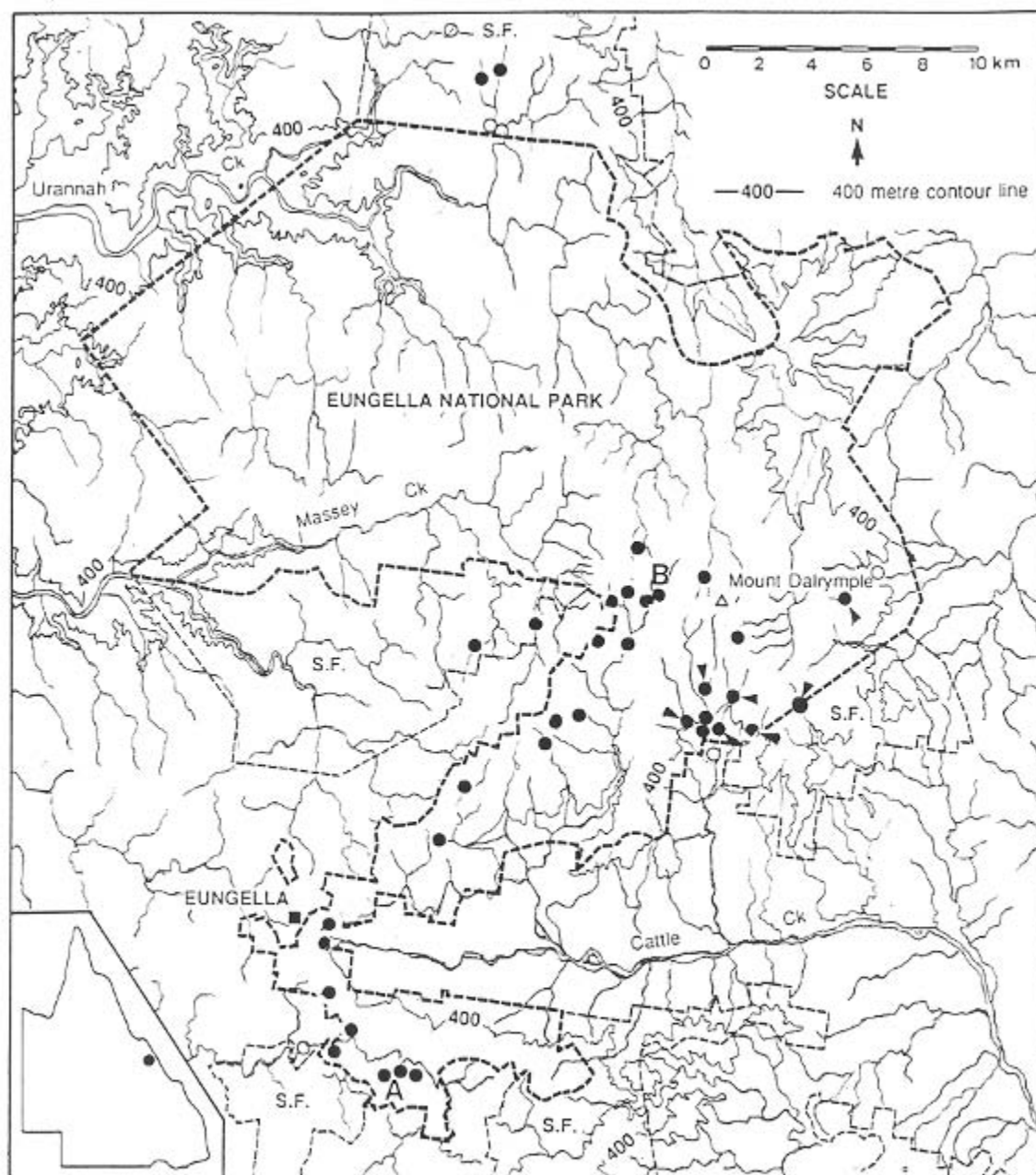


Fig. 2. Distribution of *Taudactylus eungellensis* on the Clarke Range. Closed circles indicate sites at which frogs have been located; open circles indicate sites searched and frogs not located. Arrowed sites indicate current populations. After McDonald 1990 Page 188.