

Painted Burrowing Frog
(Neobatrachus pictus)
Recovery Plan



April 2000

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**NSW National Parks and Wildlife Service Recovery Planning
Program**

Painted Burrowing Frog
(Neobatrachus pictus)
Recovery Plan

**Prepared in accordance with the New South Wales
*Threatened Species Conservation Act 1995***

April 2000

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Foreword

The conservation of threatened species, populations and ecological communities is crucial for the maintenance of this State's unique biodiversity. In NSW, the *Threatened Species Conservation Act 1995* (TSC Act) provides the framework to conserve and recover threatened species, populations and ecological communities through the preparation and implementation of recovery plans.

The preparation and implementation of recovery plans is identified by both the National Strategy for the Conservation of Australia's Biological Diversity and the approved NSW Biodiversity Strategy as a key strategy for the conservation of threatened flora, fauna and invertebrates. The object of a recovery plan is to document the research and management actions required to promote the recovery of a threatened species, population or ecological community and to ensure its ongoing viability in nature.

This plan describes our current understanding of the Painted Burrowing Frog, documents the research and management actions undertaken to date and identifies the actions required and parties responsible to ensure ongoing viability of the species in the wild.

NSW National Parks and Wildlife Service has prepared the Painted Burrowing Frog Recovery Plan with the assistance of a number of people. I thank these people for their efforts to date and look forward to their continued contribution to the recovery of the species.

BOB DEBUS MP
Minister for the Environment

Executive summary

Introduction

Legislative context

The *Threatened Species Conservation Act 1995* (TSC Act) is NSW's most comprehensive attempt at establishing a legislative framework to protect and encourage the recovery of threatened species, populations and communities. Under the TSC Act, the Director-General of National Parks and Wildlife Service has certain responsibilities including the preparation of recovery plans for threatened species, populations and ecological communities. This Recovery Plan has been prepared in accordance with the provisions of the TSC Act.

Preparation of plan

This Recovery Plan has been prepared with the assistance of interested parties with relevant expertise. Components within the plan do not necessarily represent the views nor the official positions of all the individuals or agencies consulted. The information in this Recovery Plan was accurate to the best of the NPWS' knowledge on the date it was approved.

Current species status

Neobatrachus pictus (Painted Burrowing Frog) was previously known only from southern South Australia and far western Victoria (Cogger 1996). However, in 1995 a specimen was collected from Scotia Sanctuary, 120 km north-west of Mildura in NSW (Ayers *et al.* 1996), which extended the eastern margin of its known national range (Cogger 1996). As *N. pictus* is known from a single record in NSW it is considered to have a restricted distribution within the State.

N. pictus is listed as an endangered species on Schedule 1 of the *Threatened Species Conservation Act 1995* (TSC Act). This species is not currently listed on the Commonwealth *Endangered Species Protection Act 1992* (ESP Act) or in the IUCN (1994) Red List of Threatened Species. *N. pictus* is secure within its range in South Australia and Victoria (Tyler 1992, M. Mahony pers. comm.).

Recovery objectives

The overall objective of this Recovery Plan is to clarify the conservation status of *N. pictus* in NSW.

Specific objectives of this Recovery Plan are to:

1. confirm the existence of *N. pictus* in NSW;
2. encourage the location and identification of any extant populations;
3. improve our knowledge of the distribution of *N. pictus* in south-west NSW;
4. identify any current or potential threats to identified populations.

Recovery criteria

Recovery criteria for *N. pictus* are that:

1. the current conservation status is clarified;
2. relevant and interested stakeholders are aware of the species and its conservation through their involvement in recovery actions.

Recovery actions

Recovery actions for *N. pictus* will be directed towards:

1. the identification of burrowing frogs from incidental collections;
2. relevant landholders and interested stakeholders being made aware of the species and its conservation through the preparation and distribution of photo identification sheets.

Biodiversity benefits

The widely publicised decline and extinction of amphibian species at a state, national and international level is a cause of serious concern for biodiversity conservation. Through awareness of the fate of *N. pictus*, the profile of all threatened species will be raised in the general community. This will lead to greater opportunities for the conservation of threatened species, in particular amphibians, and increased protection of biodiversity.



BRIAN GILLIGAN
Director-General

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1 **Current conservation status**

The Painted Burrowing Frog, *Neobatrachus pictus*, is listed as an endangered species on Schedule 1 of the *Threatened Species Conservation Act 1995* (TSC Act) because it is known from only one record in NSW and, therefore, exhibits a restricted distribution within the State. *N. pictus* was previously known only from southern South Australia and far western Victoria and as such is a new species for NSW. This species is believed to be indigenous to the State as there was no indication that this specimen was transported into NSW. In South Australia and Victoria, *N. pictus* is classified as “abundant” and “secure” within its range (Tyler 1992, M. Mahony pers. comm.). *N. pictus* is not currently listed on the Commonwealth *Endangered Species Protection Act 1992* (ESP Act) or in the IUCN (1994) Red List of Threatened Species.

2 **Description**

2.1 **General**

Scientific Nomenclature: *Neobatrachus pictus* Peters (1863)
Family: Myobatrachidae
Common Name: Painted Burrowing Frog
Other Names: Mallee Spadefoot, Spadefoot Toad, Painted Frog and Spotted Burrowing Frog (Barker and Grigg 1977, Robinson 1995).



Photo M. Mahony

Figure 1. Painted Burrowing Frog (*Neobatrachus pictus*)

N. pictus is a large burrowing frog with a snout-vent length (SVL) ranging from 46 to 58 mm in males and 48 to 55 mm in females (Barker *et al.* 1995). The dorsal surface of the head and body is grey, light brown or yellow with dark brown or olive green patches (Cogger 1996). A thin, light yellowish vertebral stripe is usually present (Cogger 1996). The underside of the body is smooth and white, except for a darker edge to the lower jaw and dark sides to the throat. The eye is particularly prominent and has a vertical pupil. The tympanum is not visible. The limbs are short and the toes are fully or almost fully webbed (Roberts 1978), while the fingers are cylindrical and lack webbing (Barker *et al.* 1995). Numerous small warts are found on the dorsal skin and the darker warts often have yellow tips (Cogger 1996). Warts are spinose in breeding males (Cogger 1996). The call of *N. pictus* is a long and musical trill (Barker *et al.* 1995).

2.2 Taxonomic significance

The Genus *Neobatrachus* comprises ten widely distributed species that are all plump burrowing frogs with vertical pupils, and are so similar that they can often only be distinguished by their calls and distribution, or by genetic analysis (Mahony and Robinson 1980, Robinson 1995). *Neobatrachus* can be distinguished from most other burrowing frog genera (*Limnodynastes*, *Heleioporus* and *Notaden*) by the combination of a pigmented metatarsal tubercle, a vertical pupil and fully webbed toes (Robinson 1995), although a few species within these genera can also have these characteristics.

N. pictus was first described by Peters in 1863 from specimens collected near Adelaide in South Australia. *Heleioporus pictus* and *Heleioporus sudelli* have both been considered synonyms of *N. pictus*, although *H. sudelli* individuals probably represented a distinct species.

N. pictus has frequently been confused with *N. sudelli* and *N. centralis* (Roberts 1978, 1997). For example, Cogger (1975) describes the range of *N. pictus* as just extending into northern Victoria, while Brook (1975) described it as occurring in almost all of Victoria. Similarly, Barker and Grigg (1977) described the range of *N. pictus* as extending only peripherally into southeastern South Australia which excluded the type locality near Adelaide. However, Barker and Grigg's (1977) description of the range was prior to a revision of the taxonomy which then recognised that *N. sudelli* was a distinct species. In south-western NSW, it is likely that *N. pictus* and *N. centralis*/*N. sudelli* are probably sympatric and have been known to hybridise in other parts of their range (M. Mahony pers. comm.). *N. centralis* and *N. sudelli* may also be the same species (Mable and Roberts 1997, M. Mahony pers. comm.).

Although *Neobatrachus* species are morphologically very similar, three main features (groin skin, call frequency and chromosome number) distinguish *N. pictus* from *N. centralis*/*sudelli*. *N. pictus* lacks the loose skin in the groin ("baggy thighs") which is present in *N. centralis*/*sudelli* (Figure 2) and has a longer call (20-40 mean pulse number) than *N. centralis*/*sudelli* (10-20 mean pulse number) (Roberts 1997). In

addition, *N. pictus* is diploid having two matching sets of chromosomes ($2n = 24$), while *N. centralis/ sudelli* is tetraploid having four sets of chromosomes ($4n = 48$) (Mahony and Robinson 1980). Of the ten species within the Australian myobatrachid genus *Neobatrachus*, four are bisexual tetraploids (*N. aquilonius*, *N. centralis*, *N. kunapalari*, and *N. sudelli*) and six are diploid (*N. albipes*, *N. fulvus*, *N. pelobatoides*, *N. pictus*, *N. sutor*, and *N. wilsmorei*) (Mahony and Robinson 1980, Mahony and Roberts 1986, Roberts *et al.* 1991).

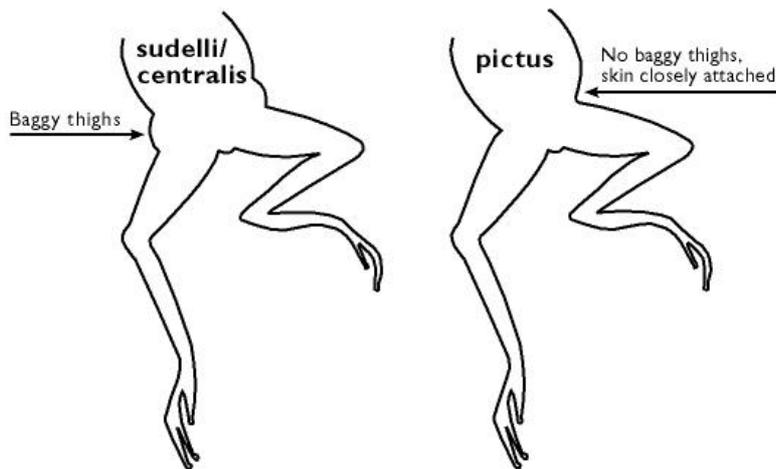


Figure 2. Loose groin skin (baggy thighs) present in *Neobatrachus sudelli/centralis* (left) and absent in *N. pictus* (right).

Further, *N. pictus* is a larger species than *N. centralis/ N. sudelli* and can be distinguished from *N. centralis* by its olive colouration and entirely black inner metatarsal tubercle (Barker *et al.* 1995), although the olive colouration varies widely across its range and the colouration of the tubercle is not always a good indicator (M. Mahony pers. comm.).

3 Distribution

3.1 Geographical distribution

N. pictus was previously known only from southern South Australia and far western Victoria (Cogger 1996) (Figure 2). However, in May 1995 a live specimen was collected from a house garden at Scotia Sanctuary, 120 km north-west of Mildura in the far west of the state (Ayers *et al.* 1996). Scotia Sanctuary is the largest and most recent of the Earth Sanctuaries Limited projects and is adjacent to Tarawi Nature Reserve. This specimen was forwarded to Professor M. J. Tyler and identified as *N. pictus* (adult male). It was then returned to the site of capture and released. This is the only known locality for *N. pictus* within NSW and its distribution is, therefore, considered restricted in the State.



Figure 3. The distribution of *Neobatrachus pictus*. (Adapted from Cogger 1992 and Ayers *et al.* 1996).

N. pictus has not been recorded from Tarawi Nature Reserve in south-western NSW or from Dangali Conservation Park in South Australia, which is also adjacent to Scotia Sanctuary. The closest confirmed *N. pictus* records (identified by the South Australian Museum from voucher specimens) in South Australia are from 34 km west of Dangali Conservation Park and from around Renmark.

3.2 Translocation

There has been no known translocation of *N. pictus* in NSW nor are any proposed in this approved Recovery Plan. There are also currently no known *ex-situ* programs operating for *N. pictus*.

3.3 Critical habitat

The TSC Act makes provision for the identification and declaration of critical habitat for species, populations and ecological communities listed as endangered. Once declared, it becomes an offence to damage critical habitat (unless the action is specifically exempted by the TSC Act) and a species impact statement is mandatory for all developments and activities proposed within critical habitat. At present, no critical habitat has been identified or declared for *N. pictus*.

4 Ecology

4.1 Life cycle

N. pictus is a burrowing species that is usually encountered when breeding, although individuals are often active on moist evenings and have been observed on roads and around swamps (Roberts 1978). Breeding only occurs after heavy rain (usually > 25 mm in 24 hours) and probably at all times of the year (Roberts 1978). Breeding has been observed in late summer, early autumn, throughout winter and in early spring

and usually occurs in shallow ephemeral pools, although dams have also been used (Roberts 1978). Breeding periods last a few days, during which time dense aggregations of adults have been observed (Roberts 1978).

Breeding males call while floating in exposed areas and under floating vegetation. Males are not discriminate when choosing mates and have been observed trying to amplex other males, spent females, and even moist rabbit dung on the pond margin (Roberts 1978). Eggs are deposited by females in clumps or long strands. The egg mass breaks down over a short period and the eggs sink to the bottom of the pool (Roberts 1978). The tadpole is pale grey with a metallic sheen (Barker and Grigg 1977) and reaches a maximum length of 90mm (tip of snout to end of tail) (Tyler 1976). Larval life spans several months (Barker and Grigg 1977).

Most burrowing frogs are able to aestivate in burrows beneath the soil surface during periods of water shortage (van Beurden 1980) by storing large amounts of energy in abdominal fat bodies, and water in relatively large bladders (Schmid 1969). *N. pictus* may stay in this dormant state for up to three months (Lee and Mercer 1967) and probably up to six years (van Beurden 1979). Burrowing frogs then emerge at the onset of rain or free water (Predavec and Dickman 1993) when they are able to absorb water rapidly (Warburg 1967) and reproduce.

When free water is no longer available, *Neobatrachus* burrows and begins aestivation by assuming a “water-conserving” posture (Withers 1995). A thin, transparent cocoon forms within a week of inactivity, due to the lack of shedding and the failure to eat the replaced epidermal layer. The cocoon covers the entire body, except for the nasal openings, and becomes progressively thicker and more opaque. The cocoon initially is attached to the skin but then separates with progressive dehydration and decreased body volume and an intervening air space forms. Despite the obvious advantage of water conservation, cocoon formation is restricted to only a few genera of arid-zone amphibians (Withers 1995).

4.2 Diet

The diet of adult *N. pictus* is not known but is probably similar to that of other burrowing frogs, which consists of a wide variety of arthropods, in particular termites (Calaby 1960). *N. pictus* tadpoles feed on large fragments of plant and insect material (Tyler 1976).

4.3 Habitat

N. pictus is usually found after rain near flooded dams, ditches and claypans (Robinson 1995). Barker *et al.* (1995) state that *N. pictus* occur in open grassland and woodland, while Robinson (1995) expands their habitat to also include mallee, farmland and cleared areas. In 1977, Barker and Grigg described the habitat of *N. pictus* as varying from forested areas on ranges to desert but this suggests some

confusion with *N. sudelli* and the range cited for *N. pictus* was consistent with the current known distribution of *N. sudelli* (Barker *et al.* 1995).

Little is known about habitat selection in *N. pictus*, although individuals have often been observed buried against the underside of large stones (Roberts 1978). Still water appears to be preferred by *N. pictus* with no individuals observed calling or breeding in flowing water. *N. pictus* has also been observed breeding in grassy marshes, lagoons and flooded claypans (Cogger 1992) and mating pairs have been observed on land where they were apparently moving towards pools.

5 Relevant legislation

5.1 *Threatened Species Conservation Act 1995*

N. pictus is listed on Schedule 1 of the *Threatened Species Conservation Act 1995* (TSC Act) as an ‘Endangered’ species. It is an offence to harm, pick or damage the habitat of a threatened species unless the damage is the result of activities which have been licensed under section 91 of the TSC Act, or have otherwise gained approval under the *Environmental Planning and Assessment Act 1979*.

5.2 *Commonwealth Endangered Species Protection Act 1992*

N. pictus is not listed in the *Commonwealth Endangered Species Protection Act 1992* (ESP Act). The ESP Act protects threatened species in Commonwealth areas and regulates the activities of Commonwealth agencies.

5.3 *National Parks and Wildlife Act 1974*

N. pictus is not known to occur in any area in NSW that is gazetted under the *National Parks and Wildlife Act 1974* (NPWS Act), and in the care and management of the New South Wales National Parks and Wildlife Service.

5.4 *Environmental Planning and Assessment Act 1979*

Land use and development on leasehold land in NSW is subject to evaluation in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act). Threatened species are to be taken into account by consent authorities when they are considering development applications under Part 4, or the carrying out, or applications for approval for the carrying out, of activities under Part 5, of the Act. Under the *Western Lands Act 1901* the Department of Land and Water Conservation is the consent authority which invokes the *Environmental Planning & Assessment Act 1979*. Recovery Plans are one of the matters which should be taken into account by consent authorities as identified under the department of Urban Affairs and Planning’s “Guide to Section 79C” guidelines. Recovery plans must also be taken into account by determining authorities under s112A of the EP&A Act.

5.5 *Native Vegetation Conservation Act 1998*

The clearing of native vegetation in NSW is subject to consent from the Department of Land and Water Conservation in accordance with the *Native Vegetation Conservation Act 1998*. The Act is integrated with the *Environmental Planning and Assessment Act 1979*, and requires that threatened species are taken into account by the consent authority when considering clearing applications under Part 4 of the EP&A Act.

6 Management issues

6.1 Threats and reasons for decline

Frog populations' worldwide have experienced declines in recent years and a number of factors, which may also occur in combination, have been proposed (summarised in Tyler and Williams 1996). These include habitat alteration and fragmentation, acid rain, feral animals, toxic pollutants, increased ultraviolet radiation and pathogens.

One of the most likely threats to the possibly disjunct *N. pictus* population in NSW is its vulnerability to one-off catastrophic events (Ayers *et al.* 1996). Mass mortality of *N. pictus* was observed near Nuriootpa in South Australia in May 1992 (Tyler and Williams 1996). Rain filled a dam to a depth of approximately 0.5 m and numerous *N. pictus* emerged from their burrows. The following day, many individuals (>32) were found dead at the edges of the dam. Tyler and Williams (1996) suggest that the deaths were due to pollutants, given the simultaneous nature of the deaths, but the source was not identified. The herbicide "Roundup" (consisting of glyphosate and a dispersant) had been used in the area three months prior but should have degraded by the time of the mass mortality. Numerous other mass frog mortalities in Australia have previously been linked to pathogens (e.g. Trennery *et al.* 1994, Cullen *et al.* 1995, Tyler and Williams 1996, Laurance *et al.* 1997) and pollutants (Read and Tyler 1990).

The impact of introduced mammals and fish on *N. pictus* populations is currently not known. However, introduced fish are potentially a major threat to recruitment in amphibians in Australia (Gillespie 1997) as are introduced rats (Tyler 1976). In Adelaide, SA, "common rats" (presumably *Rattus rattus*) were observed eating large numbers of *N. pictus* tadpoles from shallow pools (Tyler 1976).

6.2 Social and economic consequences

As *N. pictus* is known from only one individual in NSW and potential threats to the species is currently unknown, this plan does not propose to regulate or modify current land use practices. The land that supports this single individual is privately owned by Earth Sanctuaries Ltd. Any adverse social and economic consequences resulting from the implementation of this plan are either unknown or insignificant. The direct costs

of achieving the objectives of this Recovery Plan will be minimal and borne by Government.

Social benefits for local communities that may arise from this Recovery Plan includes an increased awareness of threatened species, in particular threatened frogs.

6.3 Biodiversity benefits

The widely publicised decline and extinction of amphibian species is a cause of serious concern for biodiversity conservation. Therefore, conservation of any remaining amphibian species is important with regard to the maintenance of biodiversity.

Through awareness of the fate of *N. pictus*, the profile of all threatened species will be raised in the general community. This will lead to greater opportunities for the conservation of threatened species, in particular amphibians, and increased protection of biodiversity.

7 Previous actions undertaken

In July 1999, three *Neobatrachus* individuals were collected from Scotia Sanctuary after heavy rain and lodged at the Australian Museum for identification (Tag nos. 49832, 49833, 49834). Two individuals were adult males and the other was a gravid female that contained a large number of eggs. Subsequent chromosome analysis revealed that all three individuals had 48 chromosomes in each cell (M. Mahony pers. comm.). This genetic feature indicates that these specimens were either *N. centralis* or *N. sudelli* and not *N. pictus*, which only have 24 chromosomes in each cell (Mahony and Robinson 1980). On the basis of distribution, these specimens were considered most likely to be *N. centralis*, however, a more sophisticated genetic test would be required to confirm this (M. Mahony pers. comm.). *N. pictus*, *N. centralis* and *N. sudelli* probably occur together in the south-west of the state and the area of overlap is a parapatric zone as hybrids have also been collected in this area (M. Mahony pers. comm.).

8 Species ability to recover

Given that only one specimen of *N. pictus* has been recorded in NSW, the ability for this species to recover is unknown. Successful recovery of this species, to meet the criteria of the TSC Act for downlisting, is largely dependent on the identification and status of extant populations.

9 Recovery objectives and performance criteria

9.1 Objectives of the Recovery Plan

The overall objective of this Recovery Plan is to clarify the conservation status of *N. pictus* in NSW.

Specific objectives of this Recovery Plan are to:

1. confirm the existence of *N. pictus* in NSW;
2. encourage the location and identification of any extant populations;
3. improve our knowledge of the distribution of *N. pictus* in south-west NSW;
4. identify any current or potential threats to identified populations.

9.2 Recovery performance criteria

Recovery criteria are that:

1. current conservation status is clarified;
2. relevant and interested stakeholders are aware of the species and its conservation through their involvement in recovery actions.

10 Recovery actions

10.1 Action 1 – Identification from incidental collections

Specimens of *Neobatrachus* sp. to be identified using photographs and chromosome analysis if suspected to be *N. pictus*.

Outcome:

This action will confirm the existence of *N. pictus* in NSW and is expected to contribute to meeting the remaining three specific objectives of the Recovery Plan as outlined above.

Action 1	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Incidental identifications	360	180	360	180	360
Total	\$1440				

Agency responsible for implementation

New South Wales National Parks and Wildlife Service

Funding Source

New South Wales National Parks and Wildlife Service

10.2 Action 2 – Community liaison and awareness

Encourage landholders, community groups and the general public to become aware of and be involved in the recovery effort for *N. pictus* through the preparation and distribution of a photo identification sheet (see Appendix A).

Outcome:

Community appreciation and support for the conservation of *N. pictus* and threatened frogs in general. This action will contribute to meeting all four specific objectives of the Recovery Plan as outlined above.

Action 2	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Photo identification sheets	200		120		
Total					\$320

Agency responsible for implementation

New South Wales National Parks and Wildlife Service

Funding Source

New South Wales National Parks and Wildlife Service

11 Alternative management strategies

This section considers a series of options for the recovery of *N. pictus*.

11.1 Option 1. No management action taken

As the species is abundant in South Australia and western Victoria and the occurrence of the species within NSW may simply be the result of the range of the species falling across the border, perhaps there is no requirement for any 'recovery' actions for *Neobatrachus pictus*.

This alternative approach is not considered appropriate as the TSC Act has as a stated objective the conservation of biodiversity and the recovery of threatened species within NSW. Determination of the edge of range of the species will allow for any contraction to be detected which may be critical in the long term monitoring of the species across all states in which it occurs.

11.2 Option 2. Targeted survey

A targeted survey for *N. pictus* in potential habitat after heavy rain would clarify the distribution of this species in NSW.

This alternative approach is not considered appropriate until the existence of *N. pictus* in the state has been confirmed through incidental collections and a voucher specimen is obtained.

12 Implementation

The following table allocates responsibility for the implementation of recovery actions specified in this plan to relevant government agencies for a period of five years from 1999 to 2004.

Table 1: Implementation schedule

Section	Description	Responsibility for implementation	Timeframe	Priority
11.1	Identification from incidental collections	NPWS	Ongoing	High
11.2	Community liaison and awareness	NPWS	Ongoing	High

12.1 Review date

This recovery plan and the conservation status of the species will be reviewed within five years of the date of publication.

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