

# Red-crowned Toadlet

## *Pseudophryne australis* (Gray 1835)

**Other common name(s):** None



### Conservation Status

The Red-crowned Toadlet is listed as a Vulnerable Species on Schedule 2 of the NSW Threatened Species Conservation Act 1995 (TSC Act). It is not currently listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

### Description

Red-crowned Toadlets are small frogs of the Family Myobatrachidae. As the common name suggests, they possess a bright reddish-orange 'T'-shaped or triangular pattern on the top of the head which extends between the eyes to the tip of the snout.

The dorsal body colour can be varying shades of brown with a reddish wash and often with a scattering of reddish orange spots on the back. They also have a short reddish stripe or spot in the centre of the back above the hindlimbs (known as a urostylar or coccygeal stripe) see fig. 1.

The sides and limbs are generally dark grey and patterned with a fine peppering of white flecks. There are prominent white flashes on the thighs and upper forelimbs. The undersurface is spectacularly marbled black and white.

The fingers and toes are without webbing, and the limbs are short. Red-crowned Toadlets crawl or walk slowly when moving, rather than employ the typical well-developed hopping gait of most other frogs.

Mature specimens are usually around 20-25 mm in length. When mature, females are slightly larger than males.

Some morphological and genetic variation exists over the species' range, suggesting that there are a number of isolates that warrant investigation (R. Wells; A. Stauber pers. comm.)

Red-crowned Toadlet tadpoles are very dark, almost black dorsally, with a continuous covering of melanophores. The ventral area is

also heavily pigmented. The distinctive red head colour only appears at about the time of metamorphosis.



Figure 1

### Distribution

The Red-crowned Toadlet has a restricted distribution, known from a relatively small area of mid-eastern New South Wales. It is known from isolated portions of the Sydney Basin, from Pokolbin State Forest in the north to the Nowra district in the South, and Mt Victoria in the west.

The species has undergone declines and has disappeared from significant areas of its former distribution in northern and southern Sydney as well as parts of the Watagan Range.

### Recorded occurrences in conservation reserves

Populations of this species are currently reserved in Blue Mountains, Boudi, Brisbane Water, Dharug, Garigal, Heathcote, Ku-ring-gai Chase, Lane Cove, Marramarra, Morton, Popran, Royal, Sydney Harbour, Wollemi & Yengo NPs; Barren Grounds, Muogamarra, & Nattai NRs; Bargo, Dharawal & Parr SRAs.

Although not primarily set aside for conservation purposes other significant lands providing conservation security for the species include several State Forests, Water Catchment areas and Commonwealth Dept. of Defence land at Holsworthy.

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## Habitat

Known only from Triassic sandstones of the Sydney Basin Red-crowned Toadlets are found in steep escarpment areas and plateaus, as well as low undulating ranges with benched outcroppings. Within these geological formations, this species mainly occupies the upper parts of ridges, usually being restricted to within about 100 metres of the ridgetop. Red-crowned Toadlets may also occur on plateaus or more level rock platforms along the ridgetop. This area is usually less preferred than the first talus slope areas below the upper escarpment or just below benched rock platforms.

The species has been recorded from near sea-level to about 1000 metres elevation, but most sites are on fairly low coastal ranges under 200 m in elevation.

Favoured microhabitats for shelter sites are under flat sandstone rocks ('bush-rock') either resting on bare rock or damp loamy soils. They have also been found under logs on soil, beneath thick ground litter, particularly near large trees and in horizontal rock crevices near the ground.

Red-crowned Toadlets do not usually live along permanent flowing water courses occurring in gullies, instead preferring permanently moist soaks or areas of dense ground vegetation or litter along or near head-water stream beds. These are the non-perennial first or second order drainage systems that are adjacent to ridges, are ephemeral in nature, and commonly called 'feeder-creeks'. They channel water from the ridges, benches, cliffs and talus slopes to the perennial streams in the gullies below. Such watercourses are dry or reduced to scattered shallow pools or ponds for much of the year, and have sustained flow for only a few weeks following thunderstorms. Under natural conditions these feeder creeks have high water quality and low nutrient loads.

The principal vegetation communities that are found in association with this species are the open woodland and heath communities that are typical for Hawkesbury and Narabeen geology. Tree cover, when present, is usually open and low (10-20m) and with a xeromorphic understorey.

The climate of its habitat is extreme with parts of its distribution experiencing highly variable temperature and rainfall patterns. The rainfall pattern across this species' habitat precludes regular seasonal flooding events and this is believed to explain the unusual opportunistic breeding biology of the species.

## Ecology

The Red-crowned Toadlet is a relatively long-lived species (8-10 years, Thumm unpublished), able to withstand prolonged periods of drought through its nocturnal, semi-fossorial lifestyle and use of moist microhabitat refugia. It is the only species of frog in the Sydney Basin that has adapted specifically to the sandstone ridgetop environment.

The Red-crowned Toadlet has a unique terrestrial reproductive strategy: small nests are formed within decomposing accumulated leaf matter; clutch sizes are small, consisting of around 20-24 large eggs (Thumm unpublished); nests retain the eggs through the early stages of tadpole development, which occurs within a water-filled membranous capsule; and then rainfall events flush the embryos from the nest, and tadpoles complete development within transient pools.

The timing of follow up rain events and duration of temporary pools is critical to reproductive success. Many clutches are lost to desiccation through evaporation of the shallow pools and therefore recruitment is usually in low numbers. Recent studies suggest a 0.1% reproductive success rate where tadpoles actually successfully complete metamorphosis and recruit in the wild (Thumm in press; M. Mahony pers. comm.). To offset this loss, females can lay multiple clutches and breed opportunistically when appropriate conditions prevail.

The species can also be found breeding along eroded gutters or the verges of unsealed fire trails. In these locations accumulations of leaf-litter in association with temporary pools mimics natural feeder creek breeding habitat.

The call of the male of this species has been variously described as a nasal 'ank-ank' or a short metallic 'erk' sound. It has also been likened to a grating 'cr-ee-k' repeated two or three times, as a 'squelch' sound, or an 'eeek eek' repeated several times.

Frogs have been recorded calling in all months of the year, including winter, and eggs have been found in all months. Mid-winter breeding is infrequent and likely to occur during milder weather conditions that may prevail in the coastal part of its range in some years. Winter breeding in the elevated western populations has never been recorded and is unlikely due to the lower temperature ranges experienced there.

Red-crowned Toadlets have not been recorded breeding in permanently flowing

streams or waters that are even mildly polluted.

When not breeding, Red-crowned Toadlets are thought to disperse over wider areas of its sandstone habitat, (i.e. into non-breeding areas) and many individuals have been observed sheltering under cover that would be unsuitable for egg-laying. However, it is likely that such 'dispersion' is only in the order of a few tens of metres from suitable breeding areas. Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat, so recruitment and re-colonisation of areas of vacant habitat is likely to be low.

Known prey for Red-crowned Toadlets are ants, termites, mites, pseudo-scorpions, collembolans and small cockroaches (Rose 1974; Webb 1983), although they are likely to eat most small invertebrates encountered.

Information on their natural predators is scant. Snakes are known to eat the species, but the consequences are uncertain. An immature Tiger Snake found road-killed had ingested an adult Red-crowned Toadlet (Rose, 1974) and a juvenile Red-bellied Black Snake that ate one in captivity died within minutes of consuming it (R. Wells unpublished).

The bold red markings of the species have been taken to represent some form of warning pattern against potential predators, but it is difficult to imagine how such a strategy would help a mainly fossorial and nocturnal species. The skin is known to exude a chemical secretion that has an unknown function. It may act as an anti-predator defence strategy, or perhaps an anti-bacterial or anti-fungal agent.

### Threats

The original reasons for listing the Red-crowned Toadlet by the NSW Scientific Committee were:

*Populations reduced; distribution suspected to be reduced; threatening processes severe; ecological specialist* (Lunney et al. 2000).

### Recovery Plans

NSW NPWS Threatened Species Unit, Central Directorate has not yet commenced preparation of a recovery plan for this species.

### For Further Information contact

Threatened Species Unit, Central Directorate, NSW NPWS PO Box 1967, Hurstville NSW 2220 Phone 02 9585 6678 [www.npws.nsw.gov.au](http://www.npws.nsw.gov.au)

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Several land-use practices and activities are believed to be operating individually and/or in concert with other known and perhaps unknown factors to threaten the survival of this species.

Such threats include:

- *High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition* (KTP);
  - *Bush Rock Removal* (KTP);
  - expanding urbanisation (particularly along ridge tops) and which results in - *Loss of Biodiversity as a result of loss and/or degradation of habitat following clearing and fragmentation of native vegetation* (currently a preliminary determination);
  - disease – particularly Chytrid fungus;
  - water pollution and
  - changed hydrological regimes.
- \*(KTP – a Key Threatening Process listed under Schedule 3 of the TSC Act)

### Management

- Prevention of habitat loss;
- Development and implementation of fire management plans with an appropriate fire regime for known areas of habitat. This should include appropriate buffers and a 'mosaic-burn' strategy where necessary;
- Active prevention of bushrock removal, and education concerning the collection and use of bushrock;
- Strategies to reduce stormwater runoff from ridgetop development and existing urban areas which alter the natural hydrology;
- Development of erosion and sediment control measures, particularly at the urban bushland interface to minimise nutrient loads.
- Those investigating Red-crowned Toadlets or their habitat should implement the NPWS frog disease hygiene protocol.

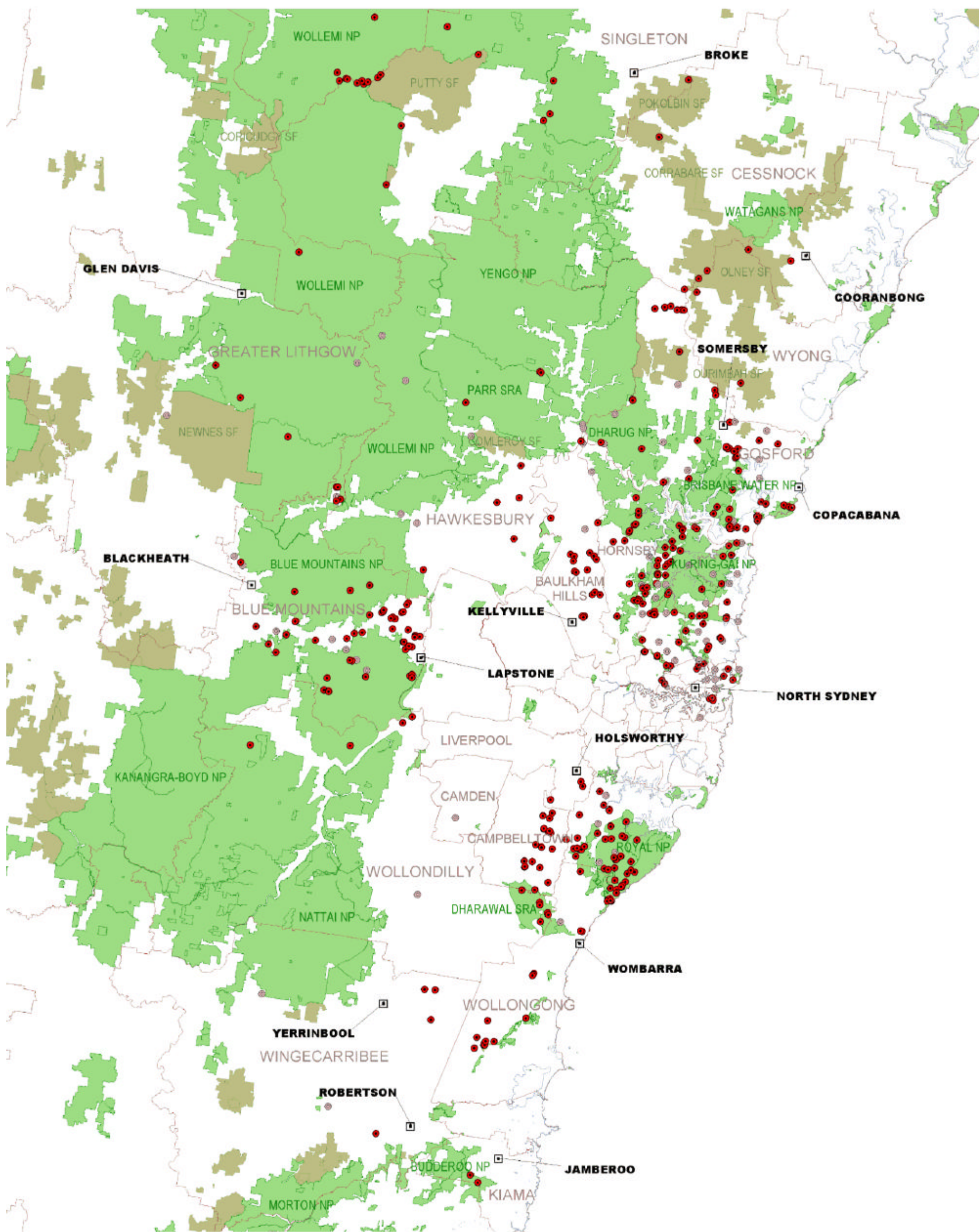
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Coastline

- Recent - Post 1990 records
- Old - Pre 1990 records

□ Towns

Local Government Areas

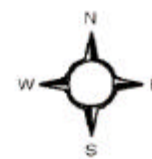
NPWS Reserve

State Forest

## Distribution of the Red-crowned Toadlet

*Pseudophryne australis*

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10 0 10 20 Kilometres

PROJECTION : Zone 56



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