



Global Re-introduction Perspectives: 2010

Additional case-studies from around the globe
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IUCN/SSC Re-introduction Specialist Group (RSG)





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Captive management and experimental re-introduction of the Booroolong Frog on the South Western Slopes region, New South Wales, Australia.

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Introduction

The Booroolong frog (*Litoria booroolongensis*) is a medium-sized hylid frog, mostly restricted to the western flowing streams of the Great Dividing Range in New South Wales (NSW) and north-eastern Victoria, Australia. It was formerly considered to be widespread and abundant throughout its range until the mid-1980s when it suffered dramatic declines. It has almost disappeared from the northern part of its range, with many local extinctions occurring throughout the remainder of its distribution (Gillespie & Hines, 1999). The Booroolong frog is listed as Endangered nationally under the Environment Protection and Biodiversity Act 1999 and as Endangered under Schedule 1 of the NSW Threatened Species Conservation Act 1995. It is listed as Critically Endangered by the IUCN. There are numerous threatening processes that may have contributed to the decline of this species. These include disease (chytridiomycosis), habitat



An adult Booroolong frog

loss and alteration, introduced fish, invasive weeds and stream drying. During the summer of 2006-2007, drought threatened to cause the local extinction of Booroolong frogs in the Maragle Creek catchment as a result of stream drying (Hunter & Smith, 2006). This was particularly concerning as the Booroolong frog was a flagship for riparian restoration on private properties along Maragle Creek. To prevent the local extinction of this population, a small founder population was collected to initiate a captive breeding program.

Goals

- **Goal 1:** Ensure the persistence of the Booroolong frog in the Maragle Creek catchment on the South Western Slopes of NSW, Australia.
- **Goal 2:** Establish a captive insurance population and develop successful husbandry and breeding protocols for this species.
- **Goal 3:** Conduct a trial release of captive-bred animals and closely monitor survival to maturity and breeding from these individuals in the wild.
- **Goal 4:** Increase public awareness for the Booroolong frog, its declining population status and its habitat requirements in the local community.

Success Indicators

- **Indicator 1:** To establish successful captive breeding protocols
- **Indicator 2:** That released animals survive to maturity and breed in the wild.
- **Indicator 3:** To increase the awareness of the Booroolong frog in the local community.

Project Summary

Feasibility: Intensive surveys were undertaken for the presence of the Booroolong frog on the South West Slopes region of NSW during 2006 (Hunter & Smith, 2006). These surveys indicated that a number of populations were under threat of local extinction due to stream drying, including those in the Maragle Creek catchment. This was largely due to the modified, agricultural land-use and prolonged drought. Due to the short lifespan of this species and its reliance on streams for breeding (Anstis *et al.*, 1998), it is especially susceptible to reduced water flows. After two years of minimal rainfall, it was determined that the risk of losing this population was sufficiently high to warrant the collection of a small insurance population and initiate a captive breeding program. This would allow the release of captive bred individuals to supplement the depleted wild population should water flows increase, and provide an opportunity to assess the capacity to utilize re-introduction as a conservation tool for this species.

Implementation: In February 2007, a founder population of 32 juvenile frogs was collected by staff of the NSW Department of Environment, Climate Change and Water (DECCW) and Taronga Zoo from three separate sites along Maragle Creek. An additional nine frogs were collected to conduct an initial disease screening to establish parasite and pathogen levels in the wild population. The frogs were transported to Taronga Zoo and held in a biosecure room and maintained under strict quarantine conditions. In late 2007, captive breeding was achieved and the majority of founder animals produced fertile spawn. For the intended release, eight spawn were obtained from 16 founder animals, to

maximize genetic diversity. These spawn were obtained in cohorts of five spawn and three spawn, spaced two months apart. The tadpoles and young frogs were reared in biosecure rooms, housing only this species, under strict quarantine. At the time of release, half of the frogs were four months old, whilst the other half were two months old. Six weeks prior to release, all 610 frogs were individually marked by clipping up to three toes. Additionally, the frogs underwent an intensive pre-release pathology screening of 30 tadpoles from each clutch. Frogs were



Frogs being released at Maragle Creek

released along a 1.5 km transect of Maragle Creek in February 2008, after it had been determined the captive stock did not contain any pathogens that were absent in the wild population. This conservation program also involved an educational campaign that provided an intensive educational experience for local primary and secondary school students at Taronga Zoo followed by an “Experts” day for students in the field. It concluded in a town-wide community expo day focusing on the conservation of the species in the town Tumbarumba, NSW, which is close to the release site.

Post-release monitoring: The release transect was surveyed four times during the two month period after release in 2008, and six times between October and February during both the 2008-2009 and 2009-2010 seasons. Surveys consisted of visual searches along the release transect at night to locate active frogs. Upon capture, each frog was identified, weighed, measured and swabbed for the presence of chytrid fungus. A total of 105 individual frogs were captured after release, with 29 frogs observed surviving through to sexual maturity and engaging in breeding activity (males calling or gravid female present in the breeding area). The size and condition of the released frogs at sexual maturity were equivalent to marked, wild frogs at the site. Only four released frogs were recorded in the 2009-2010 breeding season, suggesting that mortality to this point had been high, which is consistent with the rapid life-cycle of this species. Even so, two existing threats may have contributed to the high mortality of the released cohort, as much of the stream stopped flowing and dried out soon after release in autumn and then again the following summer, and high infection with the chytrid fungus was also recorded in the population.

Major difficulties faced

- The Booroolong frog had not previously been kept and bred in captivity. Additionally, the lifespan of the Booroolong frog in the wild is quite short, which did not allow much room for error in regards to establishing captive breeding.

Amphibians

- Some of the existing threats to the species were still operating at the release site, including high chytrid fungus infection rates and two stream drying events.

Major lessons learned

- The species has proven relatively easy to breed in captivity. In captivity the species grew to maturity and bred much faster than in the wild, and females had a much higher reproductive output, producing multiple spawn (of 400 to 1,250 eggs in each spawn) per season.
- During the first breeding season after release, the male captive-bred animals were observed engaging in breeding activity by exhibiting advertisement calling along the stream. During the second season post-release, both male and female captive-bred animals were observed engaging in breeding activity.
- This case study highlighted the importance of conducting initial pathology screening of wild individuals to establish which parasites and pathogens are present in the wild population. During the pre-release screening, a brain parasite was identified that would have aborted the intended release had it not been previously determined that it was a natural parasite in the existing wild population of this species.
- The local community has become well informed of this species due to the interactive educational campaign in the local township of Tumbarumba. As habitat loss and alteration is a significant threat to this species, educating the local rural community is an important conservation objective.

Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

Reason(s) for success/failure:

- The Booroolong frog has proven relatively easy to breed in captivity. Breeding was achieved from a large number of the collected founder animals.
- Captive-bred animals released into the wild survived to sexual maturity and engaged in breeding activity.
- Further stream drying and high levels of chytrid fungus infection may have contributed to the relatively low survivorship of released frogs.
- A successful educational campaign was undertaken in the local community of Tumbarumba.

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