

Conservation options for Christmas Island's blue-tailed skinks

Project Overview

The blue-tailed skink (*Cryptoblepharus egeriae*) and Lister's gecko (*Lepidodactylus listeri*) are two endemic reptiles to Christmas Island that are now presumed to be extinct in the Wild. Both were once common on the Island, however both declined rapidly from the 1980s, and by 2012 both had vanished from the wild.

Fortunately, in 2009 and early 2010, Parks Australia, with the help of Perth Zoo, captured 66 blue-tailed skinks and 43 Lister's geckos to establish captive breeding populations on Christmas Island and at Taronga Zoo. Captive breeding has circumvented extinction in the short term, with both captive populations now over 1000 individuals. However, the facilities on Christmas Island have reached carrying capacity, and there is strong interest in re-establishing wild populations of these two species.

Introduced predators

Several introduced predators threaten these lizard species, and were likely to have significantly contributed to their extinction in the wild. The wolf snake (*Lycodon capucinus*) and giant centipede (*Scolopendra subspinipes*) are two such species, and pose ongoing threats to reintroduced wild populations of skinks and geckos.

The wolf snake was introduced to Christmas Island in the 1980s and is now found across the entire island. On Christmas Island, the wolf snake is known to threaten native reptiles via predation. It has also been implicated in the extinction of the Christmas Island pipistrelle (*Pipistrellus murrayi*).

Giant centipedes have been present since European settlement of the island in the late 1880s. They predate on a range of native species, including native reptiles like the blue-tailed skink and Lister's gecko.



Image: Renata De Jonge, Parks Australia

Blue-tailed skinks within a breeding enclosure on Christmas Island.

Research aim

The purpose of this project is to explore options outside of captivity for these two lizard species, in the form of reintroductions back onto Christmas Island and/or assisted colonisation to other islands. Using a range of desktop, experimental, and management techniques, we are investigating what mechanisms will increase the chances of permanently establishing the blue-tailed skink and Lister's gecko in the wild.

Progress to date

Population Viability Analysis

The blue-tailed skink and Lister's gecko are now confined entirely to captivity, so ensuring these captive populations are viable now and into the future whilst translocation attempts are undertaken is critically important.

Population viability analysis is a popular tool in conservation. It is a quantitative method for assessing a population and/or a species' status and its likelihood of extinction. It can also be used to develop and evaluate conservation management options, such as harvesting captive breeding populations for translocation programs.

Using eight years of captive breeding data collected by Christmas Island National Park staff, we have undertaken some preliminary analysis on the viability of the captive breeding populations and have found they are resilient to a number of proposed

harvesting scenarios. We will continue to collect data over the next two years to reduce the uncertainty in these models and develop additional models for trial reintroduction populations on Christmas Island or elsewhere.

First trial release

In April 2017, 139 blue-tailed skinks, that were approximately one year old, were released into an approximately 0.25 hectare site (equivalent of 50m by 50m) at which introduced predators were excluded by fencing.

Before release, 57 blue-tailed skinks were weighed, measured and given an individual toe-clip combination for identification, and to assist with capture-mark-recapture and estimating population size over time. This meant 42% of lizards were toe clipped at the time of release.

Lizards were monitored using two methods. The first was using transects set up within the site and the second

was making point observations from a number of locations on the outside of the enclosure. Lizards were monitored daily for approximately 4 weeks post release and then once a week by Parks Australia staff.

Population decline and failure to establish

One month after release (early May), we attempted to catch as many lizards as possible to estimate the population size and assess animal health. We were able to capture 37 lizards of which 13 were already toe clipped. Unfortunately by the end of June/early July population counts during monitoring had significantly declined. Another mark-recapture session was undertaken four months after release (early August). Only 7 individuals were caught, all of which had a unique toe clip combination. By the end of September no individuals were seen (or detected with ink pads), and it was likely that none or very few were left in the site.

Image: Parks Australia

Traditional captive breeding enclosures on Christmas Island have been highly successful in increasing the number of skinks in captivity but are a resource intensive strategy over the long-term.





Researcher Jon-Paul Emery preparing habitat in a new soft-release enclosure. In the distant background a solid fence over 1 metre high excludes feral predators, while a lower barrier (middle of picture) is used to create individual enclosures for skink trial reintroductions. Photo: Will Copeland

The reasons and mechanisms for the population decline and failure to establish remain unclear, however a few hypotheses include: (1) unsuitable habitat, (2) predation, and (3) stress from the release of captive animals into the wild. Additionally, we were unable to locate deceased animals so investigation of causes of death could not be undertaken. All three hypotheses will be investigated through either experiments (see below) and/or explored more deeply in the next trial reintroduction.

Parks Australia staff behind one of the newer more natural captive breeding enclosures. Photo Renata De Jong



Image: Parks Australia

Learnings from first trial

The first trial established several pieces of evidence which will be important in planning the second trial. In particular:

Lizards have retained anti-predator behaviour. This was indicated as numerous individuals were observed actively avoid the Christmas Island thrush (an endemic forest bird and known predator).

Food availability and foraging capability are adequate. The body weights of all individuals that were captured during both mark-recapture sessions were approximately the same or heavier than at release indicating that food and foraging were not limiting factors.

The enclosure design effectively excludes wolf snakes. No wolf snakes or signs of wolf snakes were ever found during surveys indicating that the fencing is effectively excluding them from the area.

The enclosure design and existing eradication methods have not been effective against giant centipedes. Despite control attempts prior to and following skink reintroduction, giant centipedes remained within the soft release area in high densities.

A new giant centipede eradication method is proving effective.

Over the course of the first trial nearly 400 giant centipedes were discovered and removed over 6 months. Christmas Island National Park staff have now implemented a chemical eradication method which is working extremely well.



Right: Inside a soft-release enclosure. Image: Jon-Paul Emery

Future areas of research

Analysis of reptile extinctions on Christmas Island

We are currently undertaking a systematic assessment of the possible causal factors that may have had a role in Christmas Island reptile extinctions. This will also be placed within the context of modern (post-1500) global island reptile extinctions, noting that island species comprise 25 of the 28 global extinctions of reptile species since 1700.



Interactions between blue-tailed skinks, red crabs, and giant centipedes

Several areas of further investigation were prompted by the outcome of the initial reintroduction trial. One of the most important questions is: **what role, if any, did giant centipedes play in the failure of this trial?**

Giant centipedes are voracious predators and are known to prey on a wide variety of animals. However, they are known to have been present on the island for over 100 years, so native reptiles have persisted with them over a long period. However, the dynamics of many prey and predator populations on this island have been severely affected by the marked decline of red crab numbers in many areas, due to the establishment of supercolonies of yellow crazy ants since the 1980s.

So, a second research question is: **what is the relationship between Christmas Island red crabs (a keystone species), blue-tailed skinks and giant centipedes? And could introducing red crabs benefit the establishment of a population of blue-tailed skinks?**

*A blue-tailed skink handled during monitoring.
Photo Jon-Paul Emery*

To address these questions, we are planning to undertake a series of experiments to identify the relationships between blue-tailed skinks, red crabs and giant centipedes. The aim is to identify if red crabs could play a role in increasing the likelihood of successful reintroduction for both lizard species.

Second trial reintroduction onto Christmas Island

In July 2018, Parks Australia are planning to undertake a second trial reintroduction onto Christmas Island into the introduced predator free enclosure. The team will adapt management in light of all information learned from the first trial, including increasing predator management and increasing habitat complexity and suitability of the site. Coupled with an adapted monitoring regime, the team believes these management changes will significantly increase the likelihood of establishing a self-sustaining population.

Detailed monitoring of the second trial along with concurrent research will be used to refine management strategies and inform any future reintroductions or introductions.

Further Information

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