



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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Return of the Lord Howe Island phasmid to Lord Howe Island, Australia

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Introduction

The Lord Howe Island phasmid (*Dryococelus australis*), a giant nocturnal stick-insect, is endemic to the Lord Howe group of islands, situated approximately 600 km east of the Australian mainland. It was common on Lord Howe Island until the accidental introduction of ship rats (*Rattus rattus*) in 1918. For more than 70 years the phasmid was thought to be extinct. Although dead specimens were recovered on Balls Pyramid (a 550 m high rock stack 23 km south-east of Lord Howe Island) during the 1960s (Smithers, 1970), all subsequent attempts to locate living individuals failed (IUCN, 1983) until February 2001, when a single population of 20 or so individuals was discovered on the Pyramid (Priddel *et al.*, 2003). After its rediscovery, the phasmid was listed as critically endangered under Australian environmental legislation, a draft recovery plan was prepared (Priddel *et al.*, 2001) and a captive-breeding colony established. Now secure in captivity (>700 individuals and 14,000 eggs) (Carlile *et al.*, 2009), opportunity exists for the species to be re-introduced to Lord Howe Island. This re-introduction is only one component of a holistic ecosystem reconstruction project being planned for Lord Howe Island.

Goals

- Goal 1: Establish a captive breeding population of phasmid on the Australian mainland as security against extinction in the wild and as a source for subsequent re-introduction.
- Goal 2: Remediation of habitat on Lord Howe Island through the removal of introduced predators (rodents) and the re-establishment of natural predators (boobook owl).
- Goal 3: Re-introduction of the phasmid into the wild on Lord Howe Island.



Male Lord Howe Island stick-insect

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Success Indicators

- Indicator 1: Self-sustaining captive population of the Lord Howe Island phasmid established.
- Indicator 2: Fecundity, hatch rates and survival rates of captive nymphs and adults comparable to those of other captive stick-insects.
- Indicator 3: Exotic rodents on Lord Howe Island eradicated.
- Indicator 4: Self-sustaining population of the phasmid established in the wild on Lord Howe Island.
- Indicator 5: Exotic owls on Lord Howe Island eradicated.
- Indicator 6: Self-sustaining population of boobook owl established in the wild on Lord Howe Island.

Project Summary

In 2003, two pairs of adult phasmids were removed from Balls Pyramid to establish captive populations on the Australian mainland (Priddel *et al.*, 2003). Although all four founders mated readily in captivity and eggs were laid, one pair died only a month after capture (Carlile *et al.*, 2009). The single surviving pair, at Melbourne Zoo, continued to breed successfully but the hatch rate of eggs was poor. It was not until the third generation, when much more had been learnt about the specific husbandry requirements of this particular species, that fecundity and hatch rates increased to acceptable levels. Rapid growth of the captive population then followed, and by 2008 there were sufficient animals available to establish additional captive colonies elsewhere within Australia and overseas (Carlile *et al.*, 2009). A captive population was also established on Lord Howe Island for display and public education purposes. The captive situation has advanced to such a stage that there are now sufficient phasmids for release back into the wild. However, this can only be attempted after the habitat on Lord Howe Island has been repaired through the removal of introduced predators - ship rat and house mouse (*Mus musculus*). Although technically feasible, as amply demonstrated by the successful eradication of introduced rodents from more than 270 islands worldwide (Howald *et al.*, 2007), the situation on Lord Howe Island is complicated by the presence of a large permanent human population (about 350 individuals in 150 households) along with their domestic stock and pets. Despite the complexity, planning for the eradication of exotic rodents on Lord Howe Island is well advanced. A feasibility study and a cost-benefit analysis have been completed and an operational plan has been prepared, peer-reviewed and placed on public exhibition. Although all environmental and human health issues have been addressed, some islanders are concerned that aerial baiting with rodenticide may be more hazardous than the presence of large numbers of rodents. Community consultation and education is being undertaken to address any outstanding socio-political issues. In addition, further research is being undertaken to quantify and mitigate all identified risks to the environment, non-target species and human health.

The removal of exotic rodents from Lord Howe Island will have significant broad-ranging biodiversity, human health and social benefits. However, if not appropriately managed, there may also be some undesirable consequences. One

such possible negative consequence is prey switching where, in the absence of rats and mice, predators turn to prey on threatened endemic birds. The most likely species to do so is the masked owl (*Tyto novaehollandiae*), an exotic species introduced to the island during the 1920s in a misguided and failed attempt to control rats. To eliminate this possibility, eradication of the masked owl is planned to occur concurrently with the rodent eradication. Research into the ecology of the



Phasmid enclosure on the forest edge

masked owl on the island, with a view to developing eradication techniques, commenced in 2009. Once rodents have been eradicated from Lord Howe Island the phasmid, along with several other locally extinct species, can be re-introduced. Among those species lost from Lord Howe Island was an endemic subspecies of boobook owl (*Ninox novaeseelandiae albaria*). This nocturnal insectivore is likely to have been a major predator of the phasmid. Their demise undoubtedly began with the introduction of rats. Not only would rats have preyed on owl eggs and chicks, they also extirpated the phasmid, possibly one of the owl's major prey items. The fate of the boobook was probably sealed with the introduction of the much larger masked owl, a species that would have competed with the boobook for nesting hollows. The last time a boobook was heard on Lord Howe Island was during the 1950s. To prevent the phasmid from ever becoming over abundant, it is planned to restore the natural biological control for the phasmid by introducing another sub-species of boobook to Lord Howe Island. This will be undertaken only after the phasmid is well established in the wild.

Major difficulties faced

- Detailed ecological research could not be undertaken on the phasmid population living in the wild on Balls Pyramid due to poor accessibility, safety concerns and the extreme fragility of the habitat (Priddel *et al.*, 2003). Consequently, the captive-breeding component of this project was undertaken without any prior knowledge of the species' breeding ecology or habitat requirements. Had it not been for the dedication, skill and professionalism of staff at Melbourne Zoo, the captive colony would have failed soon after it began.
- The re-introduction of the phasmid to Lord Howe Island cannot be undertaken in isolation - it must be part of a more holistic approach to ecosystem reconstruction. The re-introduction of this one species, although relatively easy, is dependent on the eradication of three exotic species (rats, mice and masked owls) as well as being associated with the re-introduction of another

locally extinct species (boobook owl). These linkages add considerably to the complexity of the undertaking.

Major lessons learned

- It is possible for an invertebrate to become an effective flagship species for a major ecological restoration program.
- The presence of a resident human population adds considerably to the complexity of ecological operations that on non-inhabited islands would be relatively simple and straightforward.
- Eradication and re-introduction issues can cause deep divisions in island communities. Resolving such socio-political issues requires extensive community consultation, a strong educational emphasis and long lead times.

Success of project

Highly Successful	Successful	Partially Successful	Failure
		√	

Reason(s) for success/failure:

- The operation is complex and only partially completed.
- Establishment of a captive breeding colony capable of producing a sufficient number of phasmids for re-introduction has been achieved.
- Planning for the eradication of rodents on Lord Howe Island is well advanced, but the eradication has yet to be undertaken.
- Research on the masked owl has commenced but an eradication plan has yet to be formulated.
- Planning for the re-introduction of the boobook owl has yet to commence.

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