



Global Re-introduction Perspectives: 2016

Case-studies from around the globe

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IUCN/SSC Re-introduction Specialist Group (RSG)



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Cover photo: Clockwise starting from top-left:
i. Bolson's tortoise, USA @ Turner Endangered Species Fund
ii. Wetapunga, New Zealand @ Richard Gibson
iii. Morelos minnow, Mexico @ Topiltzin Contreras-MacBeath
iv. *Silene cambessedesii*, Spain @ Emilio Laguna
v. Tasmanian Devil, Maria Island, Tasmania @ Simon DeSalis
vi. Agile frog, Jersey @ States of Jersey Department of the Environment

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A trial of release protocols for re-introduction of the bush stone-curlew to southern Australia

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Introduction

The bush stone-curlew (*Burhinus grallarius*) is a ground-dwelling non-passerine endemic to Australia. The total population is estimated at 15,000 birds (Garnett & Crowley, 2000). The species is listed as 'Least Concern' under IUCN criteria. Nevertheless, populations in southern Australia have suffered a marked decline over the past century (Marchant & Higgins 1993; Schodde & Tidemann, 1997). The species is listed as Endangered in the states of New South Wales and Victoria, where populations are estimated at around 1,000 breeding pairs. The key threatening processes are identified as poor recruitment due to predation by feral cats (*Felis catus*) and foxes (*Vulpes vulpes*), exacerbated by land clearing and loss of woody debris utilized for camouflage (Schodde & Tidemann, 1997; DEC, 2006).

Australian Wildlife Conservancy (AWC), a not-for-profit private conservation organization, is a leading exponent of re-introductions in Australia. Most re-introductions by AWC to date have been native mammals. In 2013, AWC conducted a trial re-introduction of bush stone-curlews to Scotia Sanctuary, south-west New South Wales. Birds were released inside a 4,000 ha fenced enclosure free of feral predators, into which a number of native marsupials had already been re-introduced, and to an adjacent area where foxes and cats were present, but controlled.

Goals

- Goal 1: Establish a population of bush stone-curlews on Scotia Sanctuary from mixed genetic origin, whereby a breeding cohort is established and young are successfully recruited into the population.
- Goal 2: Assess whether re-introduction of bush stone-curlews in semi-arid southern Australia requires



Bush stone-curlew

© David Roshier

complete exclusion of feral predators, or whether suppression of feral predators is sufficient.

- Goal 3: Trial delayed release protocol to encourage site fidelity post-release.
- Goal 4: Trial delayed release protocol to facilitate juvenile flocking behavior post-release.
- Goal 5: Trial provision of supplemental food post-release to encourage site fidelity and improve survivorship of captive-reared birds post-release.

Success Indicators

- Indicator 1: Short term (3 months)
 - ⇒ Success in the trial release methodology, resulting in individuals remaining as a flocking group, remaining in the local area, and >75% of released birds surviving 3 months post-release.
- Indicator 2: Medium term (3 - 12 months)
 - ⇒ Continued presence of birds in the local area with >50% survivorship at 12 months (or until transmitters stop functioning, a maximum of 12 months).
 - ⇒ Establishment and evidence of birds at known roosts (on camera traps).
- Indicator 3: Medium/long-term (1 - 5 years)
 - ⇒ Annual detection of birds via call play-back.
 - ⇒ Evidence of breeding.
- Indicator 4: Long term (>5 years)
 - ⇒ Evidence of breeding.
 - ⇒ Estimated numbers match or exceed numbers released.

Project Summary

Feasibility: Scotia Sanctuary is a 64,653 ha property located in south-west New South Wales, Australia. It has a semi-arid climate (250 mm rainfall/annum) and the dominant vegetation is 'mallee' (*Eucalyptus spp.*) on sand dunes and belah (*Casuarina pauper*) in swales (inter-dune area in a dunefield). Within Scotia, two 4,000 ha areas are enclosed by conservation fencing. Introduced predators (foxes & cats) and herbivores (goats, rabbits) have been eradicated from the fenced area, facilitating the re-introduction of five species of regionally extinct marsupials. Outside the fence, feral predator control (primarily targeting foxes) is undertaken across 37,000 ha, with the aim of reducing the density of feral predators sufficiently to conserve native fauna.

The bush stone-curlew is a nocturnal ground-nesting bird once present over much of Australia. Outside the breeding season, birds form groups of 10 to 20 individuals that walk or fly to foraging grounds within 20 km of roosting sites (Schodde & Tidemann, 1997). Given its vast range, the bush stone-curlew is not reliant upon particular habitats. In western NSW, the bush stone-curlew utilises chenopod shrublands, spinifex hummock grasslands and semi-arid woodlands dominated by belah with leaf litter, a grassy understorey and fallen timber (OEH 2015). Bush stone-curlews previously occurred across the 'mallee' landscapes of

southern Australia. Extant populations occur along the Murray River, 180 km south of Scotia.

Implementation: Twenty birds were sourced from five different captive-breeding facilities across three Australia states. Birds underwent health screening and were sexed via DNA analysis prior to arrival at Scotia. Birds were divided into two release groups of equal sex ratio and mixed genetic origin then held in their release groups in aviaries constructed 1)



Belah woodland habitat © W Lawler - courtesy of Australian Wildlife Conservancy

inside and 2) outside the conservation fence (at the core of the feral predator control area), for a minimum of 30 days before release. The delay served as a quarantine period and was expected to facilitate acclimatization, encourage juvenile flocking behavior and improve site fidelity post-release. Water and supplemental food were provided daily, with the proportion of live prey increased gradually to improve foraging ability.

During the animals' final week in the aviaries, they were captured and fitted with unique individually numbered metal Australian Bird and Bat Banding Scheme (ABBBS) bands on the tarsus, a numbered coloured leg band on the tibia (for visual identification), and a small leg-mounted VHF radio transmitter on the tibia (typical range of 500 m and 1 year battery life). While in hand, all birds underwent post-quarantine health screening. Birds remained in aviaries for an additional week to recover from the handling process before being released. Aviary gates were opened in September 2013 to coincide with the seasonal increase in invertebrate activity. Supplementary water was provided continually and food was provided daily for 2 weeks after release, then weekly for the next month.

Post-release monitoring: Camera traps were established at aviary gates, feed stations and water points to monitor usage for 2 months post-release. Radio-tracking provided information on dispersal, group behavior and survivorship. Each bird was located daily for the first two weeks post-release, 2 - 3 times a week for the following month, and weekly thereafter, until they were no longer detectable. Radio-tracking was first done from a vehicle driving along a network of tracks using an omni-directional antenna and scanning receiver. Once birds were detected, directional antennae were used on foot to get a sighting (transmitters did not have 'mortality mode') or triangulation of the bird. Once birds were no

Birds

longer detectable, call play-back surveys were carried out. Nine months post-release, 53 sites were surveyed across Scotia with no responses heard. Survivorship was lower for birds inside the conservation fence, with five of the 10 birds dying 4 - 6 weeks post-release compared to one bird outside the fence. Post mortems attributed most deaths to starvation, suggesting that food access or availability was a more significant factor than predator densities during establishment in the re-introduction. Radio-tracking and camera trap data showed that birds inside the fence were further from their group mates, had lower site fidelity, and returned to the aviary less frequently during the first 2 weeks after release (while free feed was provided) compared with birds outside the fence. The lower frequency of aviary visitation and use of supplementary feed by birds inside the fence could be explained by the presence of re-introduced marsupials which were utilising the supplementary feed and excluding or disrupting feeding by the bush stone-curlews. In contrast, birds outside the fence maintained a high rate of aviary visitation until the daily feeding ceased. These outcomes suggested

that unhindered access to supplementary food was critical during the first 2 weeks post-release.

Major difficulties faced

- During planning, predation by introduced predators was considered the major risk to the re-introduction. However, the major actual cause of mortality was starvation. Furthermore, birds released inside the fenced area unexpectedly faced high levels of competition for supplementary food from re-introduced marsupials. This competition confounded our ability to compare outcomes of complete exclusion of introduced predators with suppression of introduced predators on the survival and establishment of bush stone-curlews.
- Leg-mounted VHF transmitters did not work well in this landscape for this study. The actual range was far shorter than expected, meaning that the birds could not easily be detected by the vehicle mounted omni-directional antenna from the network of tracks. Fifty percent of birds from each release group were detected for the first month post-



Aviary screened from the potential approach of external animals

release, however the rate of detection declined quickly. Detectability declined substantially between 4 and 7 weeks post-release, with only two of the remaining birds reliably located beyond this time.

Major lessons learned

- Food availability was more important for survival of bush stone-curlews than predation during establishment. Birds inside the fence had a higher mortality rate than those outside the fence where predators were controlled but still present. The majority of detected mortalities occurred 4 - 6 weeks post-release and most were due to starvation. The release was conducted during a dry year; future releases of bush stone-curlews in semi-arid landscapes may need to be restricted to relatively wet years.
- Post-release daily supplementary feed was provided to all birds. While this food was utilized by birds released outside the fence and encouraged site fidelity, birds released inside the fence were outcompeted for the food by re-introduced marsupials. Future releases inside fenced areas may need to exclude re-introduced marsupials from the vicinity of the release site, to reduce such competition.
- The trial revealed issues previously not considered in the release protocol. For example, birds housed in the aviary inside the fence were markedly more “flighty” than those outside the fence during the quarantine period, and this may have affected the flocking behavior of juvenile birds and site fidelity post-release. The aviary within the fenced area was approachable by the re-introduced mammals, whereas the aviary outside the fence was screened from the potential approach of animals such as foxes and cats. In future, it may be useful to exclude other animals from the vicinity of aviaries to minimize disturbance to birds.
- In this trial, re-introduced bush stone-curlews were reliant on supplementary feed for survival following release. These results suggest it may be useful to incorporate live prey in the birds’ diet for a longer period whilst in the aviary to improve conditioning for foraging in the wild, and provide supplementary food for a longer period post-release.

Success of project

Highly Successful	Successful	Partially Successful	Failure
			√

Reason(s) for success/failure:

- Supplemental food provision post-release was critical for establishment of released birds. Birds released inside the fence were unexpectedly deterred from feeding by re-introduced marsupials. Additional (and possibly cumulative) stressors may have been that the natural food resources within the fence were not as abundant as outside the conservation fence, also due to competition from re-introduced marsupials, and/or that captive-bred birds were not sufficiently conditioned for foraging in the wild. These factors were exacerbated by the dry conditions prevailing at the time of the release.

- The delayed release protocol to encourage site fidelity and juvenile flocking behavior appears to have been compromised by the presence of re-introduced animals inside the fenced area. Birds outside the fence were calmer and less “flighty” than birds released inside the fence in the presence of numerous medium-sized mammals. On release, birds in the fenced area immediately flew from the aviary, remained further from conspecifics, had lower site fidelity, and did not utilize the supplementary feed as readily as birds outside the fence.

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