

Saving the orange-bellied parrot

Part 1: Studies on the wild population and implications for conservation

In brief

The orange-bellied parrot is one of Australia's most imperilled species. We undertook a range of studies on the wild population at the breeding grounds in Tasmania. Key findings include the following.

Low rates of breeding success in the wild and breeding habitat quality remain critical issues in the recovery of orange-bellied parrots.

Trial burns of moorland habitat increased the abundance of several important food plant species. Further research is needed to determine optimal fire frequency.

Infertile captive-bred pairs were successfully used to foster captive-bred fertilised eggs and nestlings from other pairs to increase the number of chicks that fledge.

Ongoing monitoring of wild nests is essential to identify issues in time to implement management responses. Interventions may include substituting fertile eggs for infertile eggs and fostering or hand-rearing chicks that are ailing and would otherwise die.

Wild nests should be considered within the captive-breeding studbook to improve the representation of wild geneotypes in the captive population. We need to investigate whether genetic "Allee" affects are contributing to poor survival during the non-breeding season.

Recapturing captive-bred released birds (particularly females) at the end of each breeding season and releasing them again the following spring will increase the number of birds available to initiate nests in the wild, and reduce high migration mortality of captive-bred released birds.

Orange-bellied parrot. Image: Ron Knight, CC BY 2.0 Wikimedia Commons





Background

The orange-bellied parrot is one of Australia's most imperilled species. The species is migratory, breeding in Tasmania in summer, and migrating to coastal regions of south-eastern mainland Australia for winter.

This species has been a cause of conservation concern since the 1970s. It was the first threatened species in Australia to have a recovery team (formed in 1983), recovery plan (prepared in 1984) and emergency plan (prepared in 2010). An insurance population was established in captivity in 1985.

The orange-bellied parrot is subject to intensive conservation management, because the wild population is perilously small, with the most recent population estimate being 50 mature individuals. There is low survival of adult females and juveniles of both sexes, and a high reliance on supplementation from the captive population to prevent imminent extinction in the wild.

A key indicator for the population trajectory is the number of birds which return from their winter mainland migration to Melaleuca for breeding. In 2016–17, only

three wild-bred females returned, signifying a new low point of a long-term decline of the species.

The key threatening processes for orange-bellied parrots have not been clearly identified. The species faces numerous interacting threats, including the genetic, health and social impacts of a very small wild population, inappropriate fire regimes, habitat loss and fragmentation in both breeding and wintering locations, competition and predation, impacts of drought, and disease.

Prior research

While there are still many aspects of the threatening process for orange-bellied parrots that are poorly known, some relevant conservation management actions for the orange-bellied parrot are in place. These include:

- The establishment of an insurance population in captivity, which commenced in 1985. There is an annual release of captive-bred birds to augment the wild population at Melaleuca Inlet.
- Annual winter counts on the mainland commenced in 1979, and population monitoring has occurred at the breeding site at Melaleuca, Tasmania since 1987.
- Strategic fire management to increase the area of preferred age-class foraging habitat within the breeding range in Tasmania
- Some efforts to manage threats and habitat on the coastal wintering grounds on the Australian mainland (e.g., fox control, habitat protection).

Main aim of research

The main aims of this research were to address some of the key knowledge gaps in the ecology of the orange-bellied parrot. In this suite of research studies, we investigated the following aspects of orange-bellied parrots in the wild:

1. Persistence of the species and habitat suitability at historical sites
2. Short-term impacts of prescribed burning on orange-bellied parrot food plant abundance
3. Veterinary assessment of the population
4. Trialling new techniques to increase reproductive success of wild nests.

Orange-bellied parrot chicks bred in the wild during the project. Image: ANU



What we did

1. Survey of historical sites for orange-bellied parrots

We surveyed historical locations for orange-bellied parrots, and assessed the habitat suitability of these sites. We undertook field surveys in summer months of 2017, when orange-bellied parrots are more detectable, at locations where potential breeding habitat occurs, each with different fire histories.

We considered what factors contribute to the persistence of the species by undertaking roaming searches on areas where potential foraging habitats for orange-bellied parrots occur in Tasmania, with a particular focus on *Actinotus*, *Helichrysum*, *Eurychorda* and *Boronia* food plant species.

2. Short-term impacts of prescribed burning on food plant abundance

We implemented a two-year before-after-control-impact (BACI) study to quantify short-term impacts of fire on food plants and habitat features. We recorded the abundance of four orange-bellied parrot food plants: tiny flannel-flower (*Actinotus bellidioides*), Lemon-scented Boronia (*Boronia citriodora*), flat cord-rush (*Eurychorda complanata*) and dwarf everlasting (*Helichrysum pumilum*). We scored their site abundance according to categories: absent, 1–5 plants, 5–20 plants, >20 plants (see Table 1). We estimated the mean vegetation height at each site, and recorded whether woody plants were present, as these may suppress food plant regeneration. We surveyed sites five times: before they were burned, and one week, eight, 12 and 20 months after fire.

We opportunistically investigated the crop contents of four nestling orange-bellied parrots from three broods, to identify whether

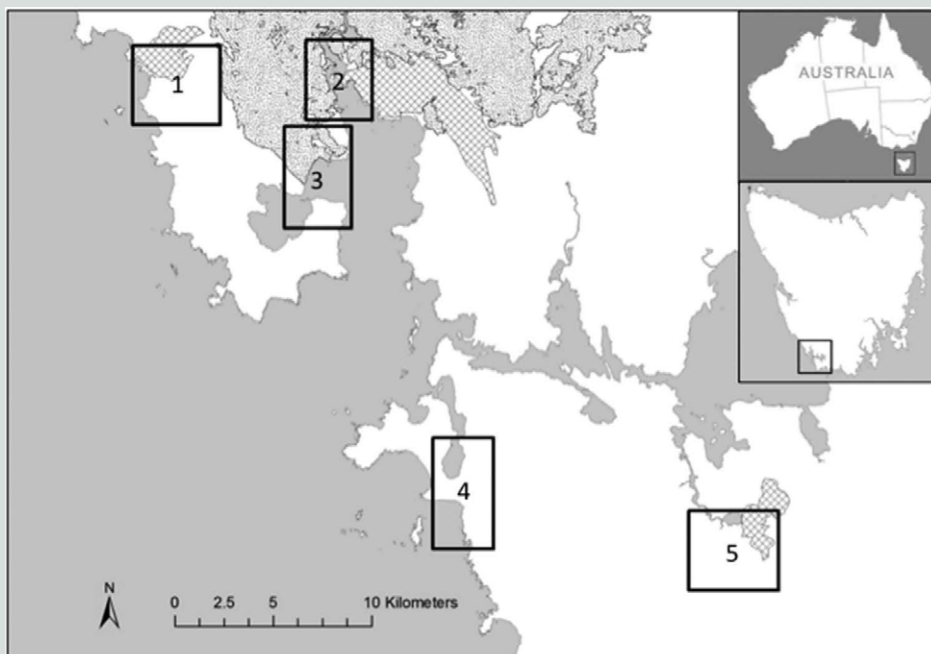


Figure 1: Map of the study area, focusing on the broader Tasmanian Southwest World Heritage Area. The study sites were: 1. Towterer beach, 2. Settlement Point, 3. Bond Bay, 4. Noyhener Beach, and 5. Melaleuca (the location of the only known extant subpopulation). Boxes encompass the areas searched at each study site. Areas burned by fire in 2011 (cross-hatched) and 2013 (stippled) are indicated.

provisioning adults ate natural foods, using a visual crop inspection method. We used electronic callipers to measure the length and width of seeds clearly visible through the crop walls of nestlings, noting that the grain sizes of supplementary food seeds are much larger than natural foods.

3. Veterinary assessment of the population

A qualified avian veterinarian opportunistically examined captured orange-bellied parrots at Melaleuca, Tasmania, to assess body condition of (wild-bred, and captive-bred released) individuals which had returned from the winter migration.

4. Trialling new techniques to increase reproductive success of wild nests

Infertility in wild and captive orange-bellied parrots poses a substantial challenge for conservation of the

species. We evaluated whether infertile breeding pairs could be used to foster captive-bred nestlings at the Melaleuca breeding ground. We attempted this by placing four nestlings with infertile, captive bred pairs of orange-bellied parrots at Melaleuca.

We trialled new techniques to increase reproductive success of the orange-bellied parrot, through:

- placing captive-bred fertile eggs or nestlings into wild nests that suffered infertility or had small brood sizes and
- removing wild-born nestlings from nests if they were ailing, and either fostering to another nest or hand-rearing to improve survival.

Key findings

The key findings from this study were as follows:

1. Survey of historical sites for orange-bellied parrots

Historical locations were significantly more likely to support food plants for orange-bellied parrots if they had been burned two years prior.

2. Short-term impacts of prescribed burning on food plant abundance

The four food plants we monitored responded differently to fire: one did not recover, one recovered one year post-fire and two reached pre-burn abundance after 20 months (Figure 2).

Table 1: Categories of plant food abundance recorded at sites

Score	Site-level plant abundance
0	Absent
1	1–5 plants
2	5–20 plants
3	>20 plants

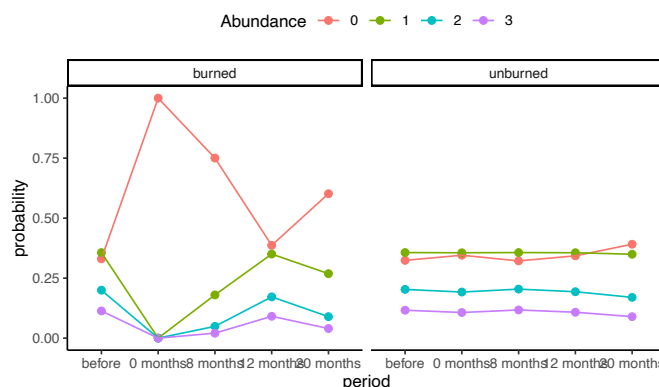
3. Veterinary assessment of the population

The veterinary assessment of a small number of trapped orange-bellied parrots found that the captive-bred individuals had noticeably poorer plumage quality (Figure 3) than their wild-bred counterparts, but were in reasonable to good body condition (based on muscle mass, fat deposits and general appearance).

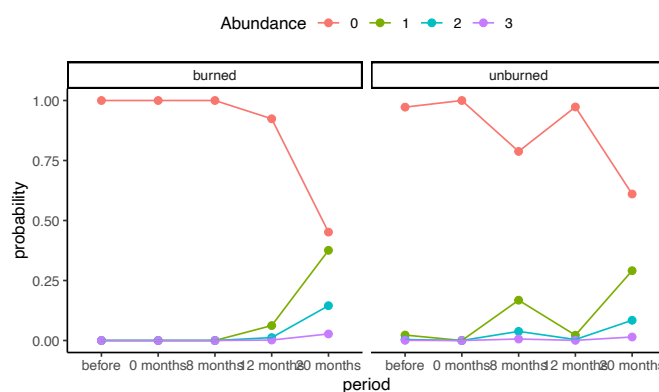
4. Trialling new techniques to increase reproductive success of wild nests

Fostering of nestlings to infertile nests showed some promise as a method to increase the reproductive success of orange-bellied parrots. Two of the four fostering attempts were successful, and one pair of infertile orange-bellied parrots successfully reared a foster nestling to fledge (Figure 4).

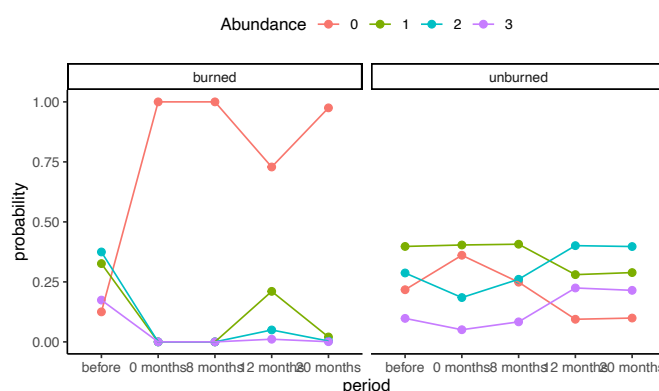
a) Tiny Flannel-flower



b) Lemon-scented Boronia



c) Flat Cord-rush



d) Dwarf Everlasting

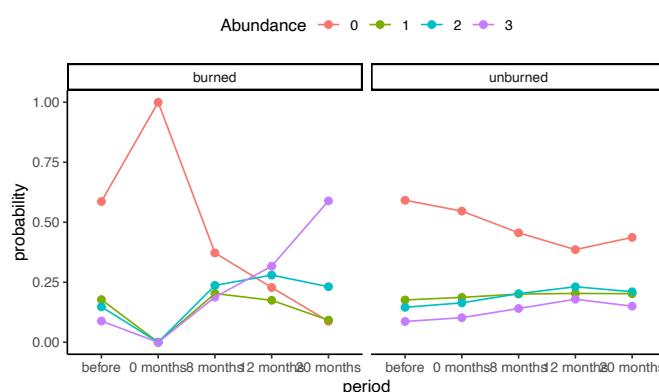


Figure 2: Modelled estimates in the abundance of four food plants at sites with a prescribed burn (left plates) and control sites without fire (right plates) following time since fire. Food plant abundance was scored within four categories (see Table 1). The coloured lines show the proportion of sites with a particular food plant abundance score. The red line is the proportion of sites where that food plant was absent.



Key findings (continued)



Figure 3: Images of feather-barbs of wild-bred (left) and captive-bred (centre) wild orange-bellied parrots. Feathers of the captive-bred birds were generally dull, dishevelled and weathered, with some showing dramatic loss of barbs at the end of contour feathers. Captive-bred released orange-bellied parrots had noticeably poorer and duller plumage quality compared to wild-bred birds. Image: Andrew Peters

Figure 4: This orange-bellied parrot nestling was identified as underweight, using a body condition index developed during this project, and was rescued by fostering to another nest. This intervention resulted in an improvement in body condition, and the nestling survived to fledge. Image: Dejan Stojanovic



Further Information

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Implications

Our research highlights that infertility of captive parrots released to the wild and the quality of breeding habitat quality remain critical issues in the recovery of orange-bellied parrots.

The approach for the management of this Critically Endangered parrot needs to be urgently revised. Key actions should include the following:

Fire management

- Fire has important consequences for food availability for orange-bellied parrots. Land managers should implement small burns in moorland habitats to encourage regeneration of food plants. Further study is needed to identify the optimal time since fire to provide the optimal foraging conditions for breeding parrots. This will be important to providing guidance on optimal burn frequency. Burn season and intensity should also be examined.

Monitoring of wild nests

- Monitoring wild nests in order to determine breeder provenance, likely nest parentage, egg fertility, nestling health and survival

- Monitoring, and initiation of a management response to any identified issues
- Adding wild nests to the species studbook, as part of measures to improve representation of remaining wild genotypes in the captive population. Continue to monitor whether Allee effects are a contributing factor to poor survival during the non-breeding season, and refine methods for managing threat.

Release and recapture of captive-bred birds

- Observations of poor plumage in captive-bred birds were not consistent with viral, bacterial or parasitic causes of feather dystrophy, and warrant further study.
- Survival rates for captive-bred orange-bellied parrots released into the wild are low. Recapturing captive-bred released birds (particularly females) at the end of each breeding season, holding them in captivity over winter and

released again the following spring will increase the number of birds available to initiate nests in the wild, and reduce high migration mortality of captive-bred released birds.

Nestling fostering

- Fostering fertile captive-bred eggs or nestlings with infertile captive-bred adults at the Melaleuca breeding ground can help improve reproductive success of the orange-bellied parrot. However, this technique is dependent on having captive donor nests that meet disease screening requirements (no evidence of beak and feather disease virus), logistic and timing constraints and the availability of donors of eggs/nestlings.

This project also addressed major gaps in knowledge about 1) traits of the captive population and conservation implications; and 2) new targeted interventions required to prevent extinction, the findings of which are presented in separate factsheets.

Cited material

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