Science for Saving Species

Research findings factsheet

Project 5.1

Threatened Species Recovery Hub

National Environmental Science Programme

Better offsets for the night parrot

Background

Biodiversity offsets are commonly used to compensate for unavoidable impacts of development on species or ecosystems by aiming to create an equivalent benefit for the same species or ecosystem elsewhere. In Australia, offsets are routinely prescribed as conditions of approval for proposed development that will impact species or ecological communities listed as threatened either nationally under the *Environment Protection and Biodiversity Conservation Act 1999*, or under state and territory laws.

For offsets to work as intended, we need to be able to quantify how much benefit an offset action will provide for a species or ecosystem at a site level in order to make sure that the offset completely compensates for the impact from the development. For many poorly-understood species and ecological communities, however, important knowledge gaps exist. This makes it hard to know what type and how much offset action is needed to offset a given impact.

Figure 1: Night parrot (Image: Steve Murphy)

This project developed an approach for eliciting the knowledge of threatened species experts in a structured way, so as to guide estimates of both the benefits and the costs of alternative offset approaches. Although it doesn't replace field-based studies, it can help decision-makers ensure that offset decisions are based on the best available information at the time, and help identify how much uncertainty there is about the effectiveness of particular offset actions. We tested the approach using several case study species that commonly trigger offset requirements, and for which developing appropriate offset proposals is considered challenging. Here, we describe the approach and findings for one of these species – the night parrot *Pezoporus occidentalis*.

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Missing then rediscovered

The night parrot is a cryptic, nocturnal bird endemic to Australia's arid interior. Night parrots were widespread until the late 19th century, and were collected occasionally until around 1870 when they began to decline severely. A reported sighting in 2005 in Western Australia led to subsequent searches for the species and the first biodiversity offset for potential disturbance to night parrot habitat in the Fortescue Marshes. In 2013, there was another sighting (accompanied by a photograph) of the night parrot, and a small subpopulation was located in remote western Queensland. In 2017, the species was found at separate sites in central and northern Western Australia, with further records from the site in northern Western Australia made by the Paruku Indigenous Rangers in 2018. Since then, the species has been detected at a further five sites in northern Western Australia.

Little was known about the behaviour and habitat use of this secretive species, but recent research has improved our understanding of the bird's ecology. At sites where the night parrot has been detected, they occupy roost sites typically in areas of long-unburnt spinifex hummocks, and fly to feed on floodplains, run-on areas, and drainage systems, usually with a high diversity of grasses and other groundcover. The two primary threats to the species are likely to be inappropriate fire regimes and cat predation, with other threats likely to include habitat degradation from livestock grazing, fox predation and invasive weeds such as buffel grass.

The night parrot is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*, but there is no National Recovery Plan in place for the species. The Action Plan for Australian Birds 2020 lists the night parrot as Critically Endangered, with few (<10) tiny subpopulations and a continuing decline highly likely.

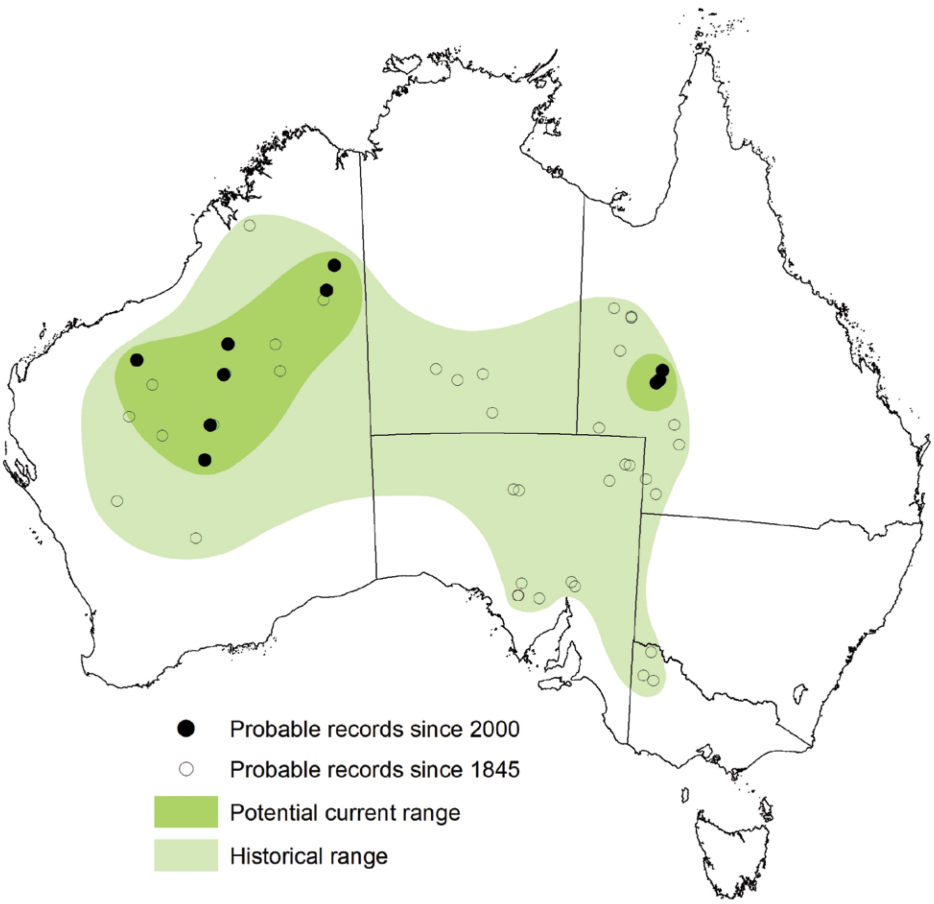

Figure 2: Historical and potential current range of the night parrot in Australia (Map by Nick Leseberg et al.)

Current approaches to offsets for night parrots

Given the lack of available information, biodiversity offsets for the night parrot have included monetary contributions towards a regional conservation initiative or research plan. Offset payments from mining have funded a national research plan for the night parrot, research on the species in Queensland, and surveys in areas with historical records.

The substantial body of research on the species since 2014 is highly valuable, but research alone does not achieve a direct benefit for the night parrot population, and so cannot counterbalance impacts.

Direct offsets need to focus on reducing the impact of threatening processes on the species, but guidance is needed as to what type and how much action to take to counterbalance a given impact.

Engaging experts to improve offset strategies

We elicited information about the effectiveness and cost of a series of management activities (detailed in Figure 3) that may benefit night parrots, based on expert knowledge. To do this, we first identified candidate management actions based on interviews with two key night parrot experts. Next, we used a structured expert elicitation protocol involving two rounds of online anonymous surveys with 11 night parrot experts, who collectively had expertise across the parrot's geographical range. Experts provided quantitative estimates of the benefits of a range of management actions at two hypothetical offset sites which had different types of environments, site conditions and past land management (Box 1).

We asked the experts to envisage the outcomes for night parrots in each hypothetical offset site after 20 years if current management did not change ('do nothing'), and if particular management actions, or combinations of these actions, were implemented. We also explored the costs and cost-effectiveness of these alternative strategies.

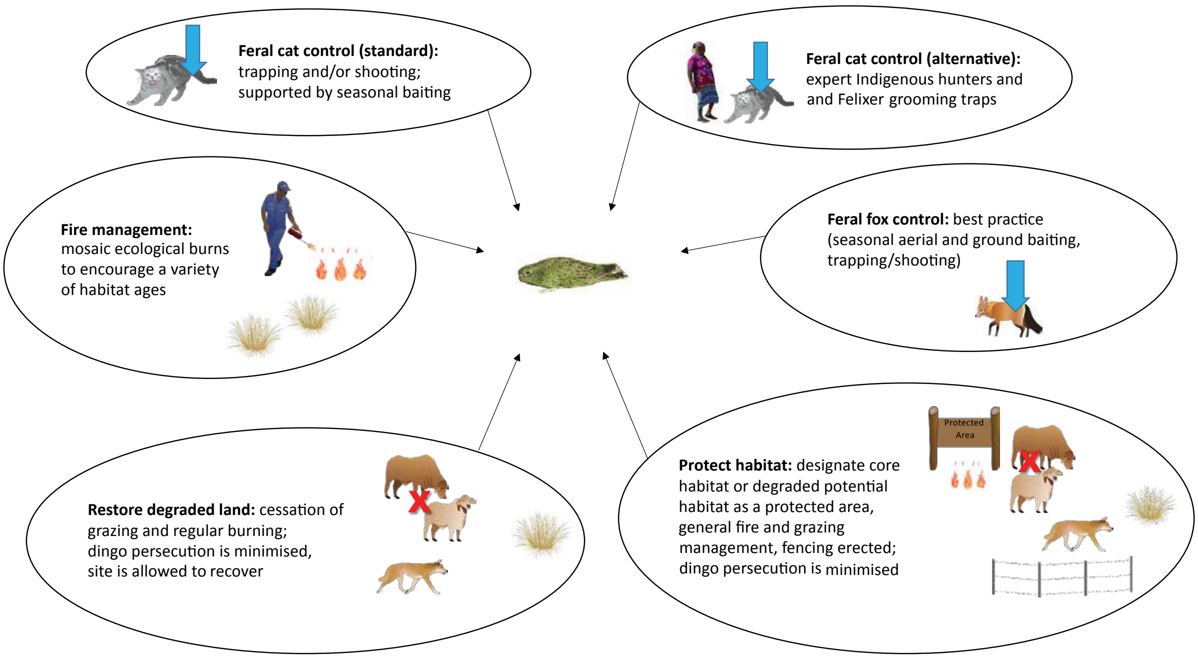

Figure 3: Potential management actions that could benefit night parrot populations. Experts considered how these actions, alone and in different combinations, would benefit night parrots at two different hypothetical offset sites (see Box 1).

Box 1: Hypothetical offset sites and benefit indicator

Management actions are likely to differ in their benefit to night parrots at different types of sites. We therefore asked experts to compare the relative benefits of management actions (Figure 3) at two different hypothetical offset sites, each 100,000 ha in size:

Site 1. Current night parrot habitat: A large cattle property with low grazing pressure and minimal human disturbance where two stable night parrot roosts (i.e. night parrots have used the site consistently for at least two years) were found in the most recent monitoring year.

Site 2. Degraded, potential night parrot habitat: A grazing property with substantial disturbance from grazing and fires where no night parrots are currently found, but has the appropriate matrix of both spinifex and floodplain herb field vegetation, which is adjacent to current night parrot habitat.

To estimate the benefits of different management actions, a suitable *benefit indicator* was required. The benefit indicator needs to be able to be readily measured and monitored at the site level, and be highly likely to relate to the viability of the species. For the night parrot, experts were asked to use the *number of stable night parrot roosts at which night parrots have been recorded consistently at the same location for 2 years* as the benefit indicator.

Effective offsetting for night parrots

On average, the experts believed that the 'do nothing' option would result in a slight decrease in the number of night parrot roosts at current habitat sites over the 20-year period. While all of the offset actions resulted in some improvement relative to this baseline scenario, the uncertainty around these estimated benefits was very high. For example, experts thought that population declines were possible even with the most effective management actions.

At the hypothetical site with **current night parrot habitat**, experts estimated that the most beneficial management scenario was the combination of all actions: protect habitat, standard feral cat control, fox control and fire management. Experts believed that intensive management of feral cats using a combination of expert Indigenous hunters and grooming traps was likely the most beneficial single individual action for night parrots. Active and targeted management was important for night parrots. Fine-scale habitat mapping is considered an important tool to inform management and protection of known night parrot roosts. Simply protecting habitat without targeted management for night parrots provided minimal benefit. Experts were also concerned about the potential perverse effects of fox control, given that dingoes can be negatively impacted by fox baiting which in turn can increase cat predation.

To achieve the greatest benefit at the **degraded, potential habitat site**, the combined actions of habitat restoration and protection, cat and fox control, and fire management were preferred. However, expert opinion suggested that actively managing threats in a site that was already occupied by parrots was a more effective approach than restoring degraded potential habitat. This was partly because the time required to restore a degraded site so that it is suitable for night parrot was expected to be far longer than the 20-year time frame considered here.

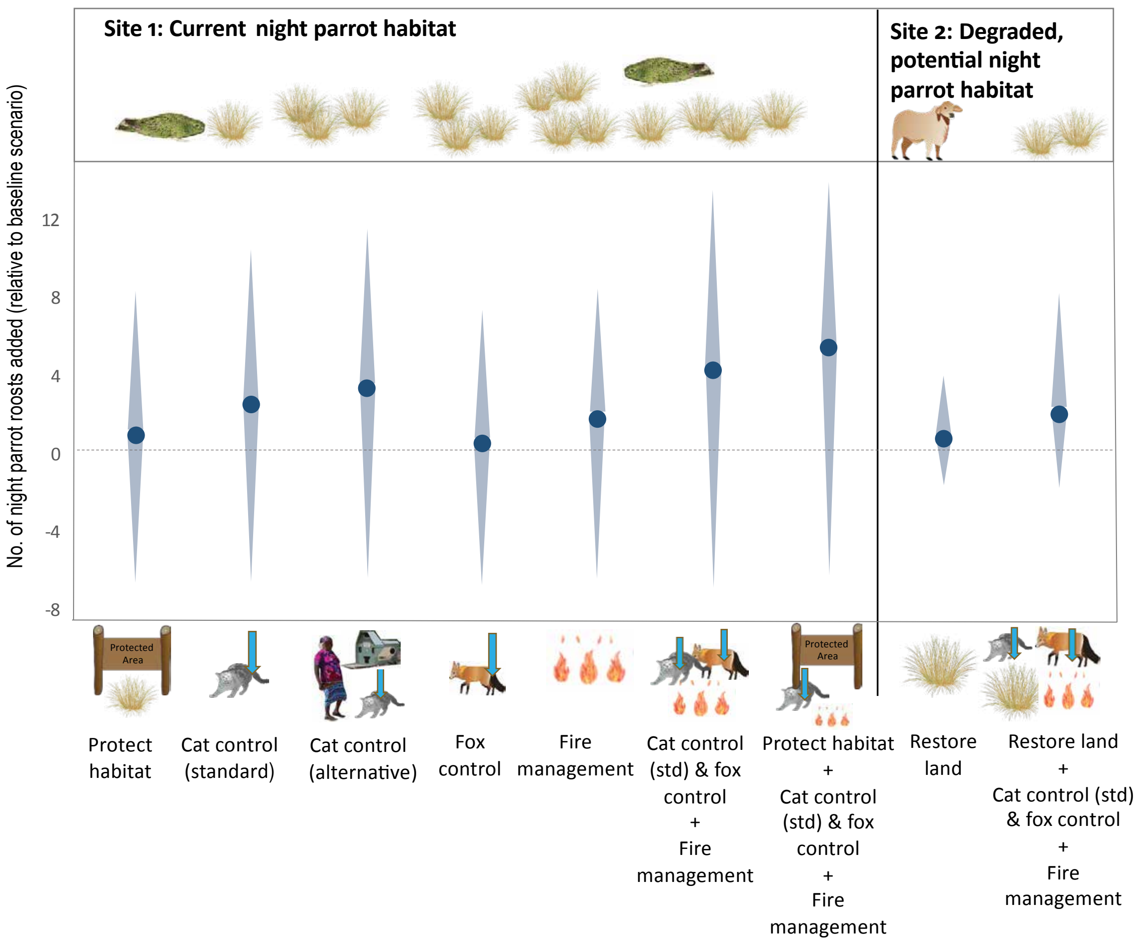

Figure 4: Results of expert elicitation showing the estimated benefit (defined as additional night parrot roosts) of different management actions for night parrots after 20 years, relative to a baseline scenario with no management ('do nothing'). The circle at the widest point in the diamond is the aggregated 'best guess' estimate. Diamonds capture the range of estimates based on the 90% confidence intervals around expert estimates. Note the 'cat control (alternative)' result is from one round of expert elicitation only.

Cost-effectiveness of offset actions

The cost estimates apply only to the management scenarios considered in the expert elicitation process. While our results can provide a guide for scaling up the area managed to achieve greater benefits for night parrots (as long as other site conditions remained consistent), they cannot be used to scale down – a given fraction of the investment would be very unlikely to achieve an equivalent fraction of the estimated benefit.

Based on the cost data we collected from experts, the cheapest interventions for night parrot were intensive cat control and ecological fire management. The combinations of management actions were the most expensive, though the costs were highly variable. For example, the total cost for habitat protection in combination with fire management, feral cat control and fox control was estimated to cost more than $4.5 million annually over a 20-year period for a 100,000 ha site of current night parrot habitat, but estimates ranged from $1.2-$7.9 million.

A much more informative metric to consider than the cost per action is the cost per unit of benefit – in other words, how much each additional night parrot roost gained was estimated to cost. Expert estimates of benefits to night parrots combined with estimates of cost suggested that intensive cat control and managing fire were the most cost-effective actions. In contrast, fox control and habitat protection alone were both costly and were thought to have low benefits, so it would cost a lot to gain one night parrot roost.

Protecting habitat, while controlling cats, foxes and fire, was estimated to cost $821,000 per night parrot roost, if done annually across 100,000 ha for 20 years. However, when accounting for the uncertainty of benefit gained, the cost/parrot roost ranged from $330,000/year to an undefined higher cost, given the lowest estimate of benefit was negative (i.e. no change in parrot roosts relative to the 'do nothing' scenario).

Restoring degraded potential habitat was much less cost-effective on average than most actions at the site with existing night parrot habitat, when considering the best estimates of costs.

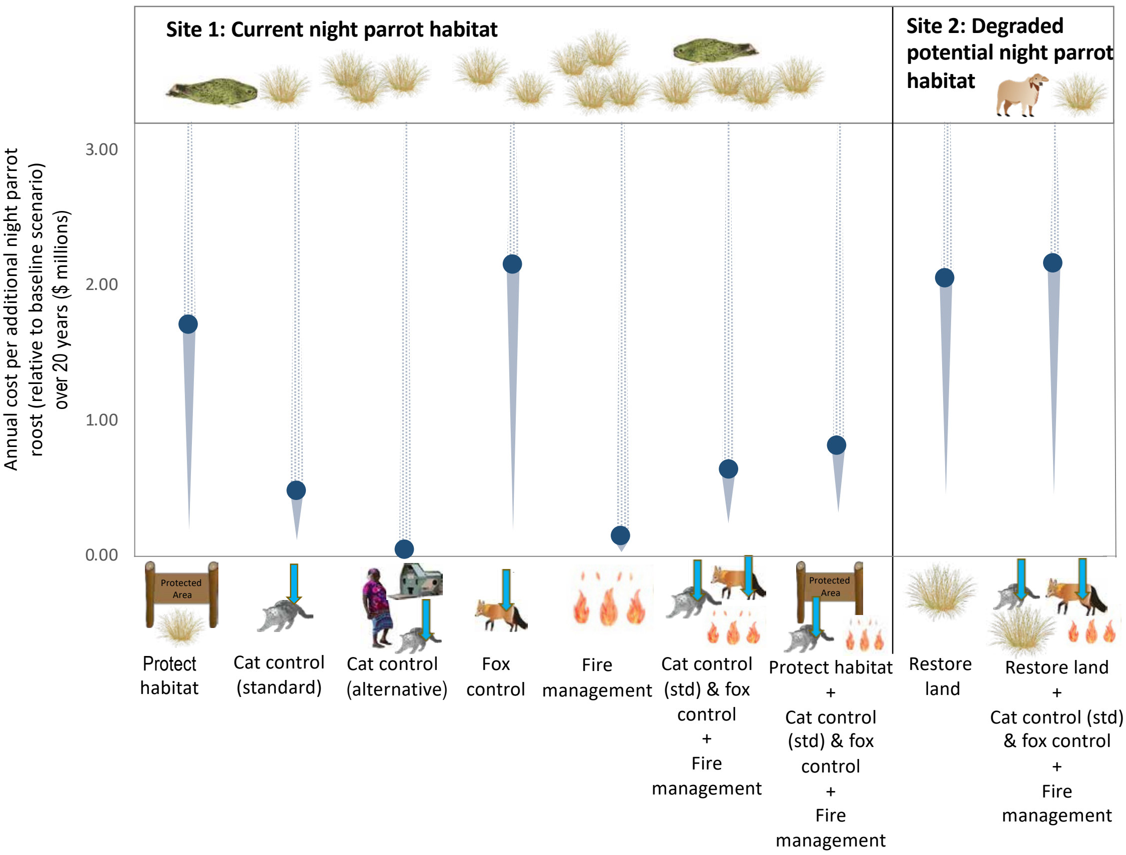

Figure 5. Cost of each action required to gain a single night parrot roost (average annual cost per night parrot roost, in million $AUD 2019, over 20 years at a 100,000 ha site, estimated using expert elicitation). The circle represents the best estimate, and the top and bottom points capture the low and high estimates of cost per night parrot roost. Due to the fact that it was possible for a benefit to be less than 0, the upper cost-effectiveness estimates are non-defined. Note: annual cost per night parrot roost was obtained by dividing the total annual costs of management action by the number of night parrot roosts experts thought could be added as a result of the management action.

Graphics

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Implications of research

Biodiversity offsets must only occur after all previous steps in the mitigation hierarchy have been considered. The design of better biodiversity offsets for threatened species will remain an ongoing challenge for policy makers, particularly for species where the relative contribution of key threats are poorly known, or for which limited quality habitat remains. A well-designed biodiversity offset is one that is based the principles of the IUCN policy, and incorporates:

- Current ecological knowledge (action plans, recovery plans, management plans, peer reviewed literature, where available) and
- Full consideration of cumulative impacts (geographically and over time).

Expert elicitation is not a perfect tool or solution for addressing issues with biodiversity offsets in Australia. It does not replace the urgent need for empirical studies to evaluate and improve on-ground management approaches. Instead, it provides a relatively quick, inexpensive and repeatable method of obtaining best available current knowledge in a way that reduces bias, and in a form that is useful to inform decision-making on biodiversity offsets.

It's only recently that intensive studies of the night parrot have become possible. Improved understanding of its ecology and active management of key threats are needed in order to conserve the species. Results from this expert elicitation process suggest:

- the protection of current habitat, combined with best-practice management of feral cats, feral foxes and fire, may be the most effective conservation actions for the night parrot. These actions are the most costly, but will likely result in the greatest conservation gain for the species.
- intensive cat control (led by expert Indigenous hunters) and fire management may be the most cost-effective individual actions, but each have high uncertainty about the benefits
- there remains very significant uncertainty around the efficacy of different conservation actions for this little-known species. As such, it is risky to rely on offsets as a response to impacts on night parrots.

Further reading

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