

Social landscape of the night parrot in western Queensland, Australia

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Abstract. The attitudes of the owners or managers of properties potentially supporting populations of night parrot (*Pezoporus occidentalis*) in western Queensland, Australia, were explored using interviews to understand whether they would be sympathetic to the species' conservation. Eighteen interviews were carried out by a former member of the local grazing community and found a high level of support for conservation, especially if it did not unduly disrupt existing grazing management practices and there was compensation in the event property management needed to change. This included trying to limit burning and not overgrazing habitat in which the parrot might occur. It also included the cessation of wild dog baiting, which is conducted to reduce calf losses, although concern about wild dogs was deeply entrenched. While some graziers were indifferent, none were openly antagonistic to parrot conservation that might involve their property. The results suggest that collaborative management with local graziers can contribute substantially to conservation of the night parrot in the region and any fears that graziers might be antagonistic to night parrot conservation are ill-founded.

Additional keywords: graziers, habitat management, threatened species.

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Introduction

The May 2013 discovery of a population of the night parrot (*Pezoporus occidentalis*) (Koch 2013), an arid-adapted parrot of which no extant population had been located for over a century (Murphy 2013), suddenly made it both possible and urgent to identify and mitigate threats to the new population (Pyke and Ehrlich 2014). Formal investment from government prioritised identification of proximate biophysical threats such as cat predation, fire or cattle grazing (Murphy 2014). However, while biophysical threats to biodiversity are often analysed, almost all extinctions are a function of human agency (Szabo *et al.* 2012) and most threats are emergent properties of the human social environment within which the biodiversity occurs (Ban *et al.* 2013). Thus effective management of threats requires not just an understanding of the biophysical drivers of population change but also the social attitudes and behaviours of those who can influence how those drivers operate (Manfredo 1989). Effective conservation management also needs to be cognisant of the institutional regimes, formal and informal, within which attitudes and behaviours are expressed.

The night parrot was discovered on land leased from the Queensland Government for grazing by cattle or sheep. Parrots were found in large long-unburnt patches of spinifex (*Triodia*

longiceps), a member of a distinctive Australian grass genus that forms large spiny shrub-like hummocks that grow among low stony hills. Concern was expressed privately to members of the research team that some graziers with a potential for night parrots to occur on their properties might not be sympathetic to their conservation and, indeed, might reduce the likelihood of occurrence by burning potential habitat should they themselves feel threatened by efforts to conserve the species. There were some grounds for nervousness from both graziers and those wishing to conserve parrots. Within the memory of many leaseholders in the region, leases had been compulsorily resumed by the State for the purposes of conservation (Fitzpatrick and others vs Crown 1992). On the other hand, in the USA threatened species or their habitat have been destroyed soon after their discovery on private land to avoid intervention by the Federal Government using the power of the *Endangered Species Act* to protect threatened species (Adler 2008).

There has also long been a recognition in Australia that acquisition of habitat by the State is not necessarily the best model for threatened species conservation and that off-park conservation can play an important role (Cary and Webb 2001). Funding for protected area management is almost always less than the amount required and tends to be spent on infrastructure

for visitors ahead of biodiversity conservation (Australian Senate 2007). Alternative models for off-park conservation vary from acquisition and management by private individuals or organisations for the express purpose of conservation (Kamal *et al.* 2015) through to agreements with existing land owners to change their management if necessary to ensure conservation of key biodiversity assets.

This last option requires that landholders be sympathetic to conservation and willing to change management if necessary, which usually (but not always) requires compensation to cover reduced production or opportunity costs (Moon and Cocklin 2011). A recent study across Australia north of the area considered in this paper found that graziers would be willing to accept about AU\$11 per hectare per year to exclude stock from sensitive habitat on a long-term basis, though this could be reduced considerably if there was flexibility in the contract or if exclusion was for only part of any year (Greiner 2014). The willingness of graziers to participate in such schemes was strongly associated with underlying values, and could be enhanced with appropriate incentives (Greiner 2015).

However, changes in behaviour rarely happen in isolation. While theories of behavioural change such as the Reasoned Action Approach (Fishbein and Ajzen 2011) suggest that intention to act is influenced by beliefs of the individual and their capacity to exercise control over a decision, these intentions are also moderated by the normative opinions of others. Therefore conservation actions of individual graziers need to be placed in a regional context to understand the types of pressure they might be under to conform with wider community norms and which might constrain the actions of individuals.

To this end this paper describes a survey of the attitudes of most of the owners and managers of pastoral and grazing properties with suitable habitat in the region in which the night parrot was discovered. The primary purpose of the survey was to develop support mechanisms for the graziers to become involved in threatened species management. At the same time we wished to ascertain which properties would entertain hosting additional surveys or research relating to night parrots as well as to determine who would consider changing their management to suit the parrot and, if so, in what ways. The sample size is relatively small but the area of land is very large so the attitudes of a small number of people can affect a substantial proportion of Queensland, and most of the potential habitat of the parrot in the region.

Methods

The owners and/or managers of the 44 properties that support potential habitat in the region where the night parrot was found were contacted and invited to participate in interviews about their attitude to the night parrot and approaches to land management (see Table S1 available as supplementary material to this paper). All were cattle properties covered in a mix of grassland, shrubland and low woodland, with most cattle grazing occurring on plains dominated by annual grasses and forbs, interspersed with perennials such as Mitchell grass (*Astrebla* spp.), away from areas dominated by spinifex. The only perennial water in the region was in waterholes along the largest rivers, with grazing supported by provision of bore water. The climate was cold at night in winter but otherwise warm to

hot, with temperatures commonly exceeding 40°C in summer. Rainfall averaged below 250 mm a year, falling primarily from December to March, but was highly variable with multiyear droughts frequent.

In aiming to ascertain ways in which graziers could become involved in threatened species conservation we sought their views on: conservation and means of effecting it (National Parks, private conservation, stewardship); knowledge about and interest in the night parrot; and, attitudes towards potential means of managing the three most obvious short-term threats to the night parrot's persistence – overgrazing of the habitat by cattle, predation by feral cats and burning old spinifex. We also explored the level of interest in receiving stewardship payments, and what for, and the potential of using the parrots themselves as an attraction for paying tourists.

While the original intention was to visit each target property in person, after introductory telephone calls it was obvious that this would be logistically impossible to do in a cost-effective manner. Therefore it was decided to conduct the interviews by telephone with answers recorded, via an electronic form, in a spreadsheet for subsequent analysis. Interviews were all carried out by author MK, who was familiar to most interviewees. The questionnaire was delivered in a conversational style with additional elicited details recorded against each question. Answers to some questions were contingent on the answers to other questions. Transcripts of the interview were then made available for additional comment or correction by the graziers – 16 emailed, one mailed. One responded with some refinements to their answers and another responded with confirmation that they were happy with the accuracy of the record; from the balance, there was no response.

Two forms of analysis were conducted. First, descriptive statistics were tabulated to summarise knowledge and attitudes. Inferential statistical analysis was not undertaken because those interviewed had responsibility for almost all properties in the region that could support the parrots. While the total number of properties is relatively small, and the number of people who could be invited even smaller since there was often one owner for several properties, the area encompassed by these properties was very large (a combined area of 45 000 km²), stretching across western Queensland from near Winton to the Northern Territory border (Fig. 1). These data therefore represent the knowledge and attitudes of those responsible for a large area of potential night parrot habitat and no inference is made about the owners or managers of those who did not participate in the survey.

Second, the textual data was examined for passages that encapsulated the principal messages emerging from the interviews so that these messages could be conveyed in the language of those who delivered them, providing context for the descriptive statistics.

Results

Twenty-six people were invited to participate in the survey. Collectively, they had responsibility for the 44 properties that contained habitat that could have supported populations of night parrot at some stage in their recent history based on knowledge of their local ecology at the time (S. Murphy, pers. obs.).

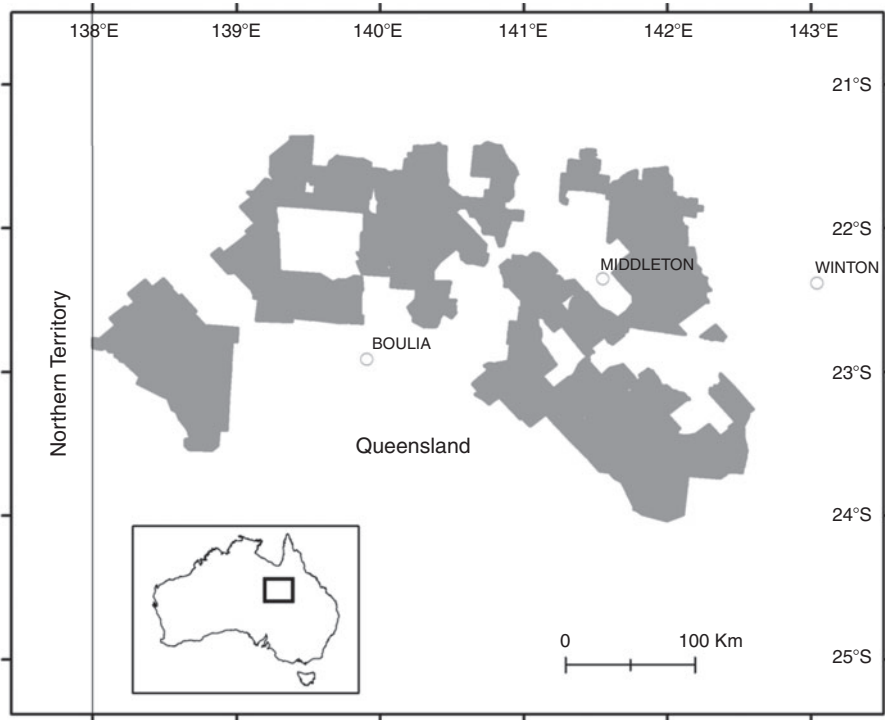


Fig. 1. Map of properties whose owners/managers agreed to be interviewed about their attitudes to night parrot conservation.

Of these, 23 agreed. The 18¹ who were ultimately interviewed had responsibility for 41 properties (5 managers, 14 owners²). All the owners expressed a wish to pass the property on to family in the future. The individual graziers had a median of 35 years of experience in the pastoral industry (range: 0–65 years) with a median of 19 years for each property (range: 1–65 years).

To give respondent answers a general context, all graziers were asked to rank the following policy issues in order of importance: Economic growth, Conservation, Healthcare, Education, Employment, and Immigration. Several graziers expressed discomfort with the question, with one expressing that it could 'be taken out of context easily'. A number commented that the variables were linked and in reality had equal importance. Nonetheless, the majority of respondents ranked economic growth as the most important (Table 1). Education came through as the second most important whereas conservation, employment and healthcare were all ranked similarly. All but one respondent ranked immigration as the least important.

All but four interviewees felt that the responsibility for managing threatened species on private land is jointly the responsibility of government and landowners, but most also felt that government should bear the financial costs (Table 2). One suggested that the cost should not be great: 'if you don't interfere with the threatened species, shouldn't cost you too much to look after them' but none knew of government management of threatened species outside National Parks and most had little knowledge of threatened species management on National Parks. Those who did expressed largely

Table 1. Ranking of social issues by landholders

Ranked from 1 (highest) to 6 (lowest); $n = 18$

Policy issue	Average rank	No. ranking highest	No. ranking fifth
Economic growth	1.9	11	1
Education	2.4	5	1
Conservation	3.3	1	5
Healthcare	3.4	0	6
Employment	3.9	0	5
Immigration	5.7	1	0

negative sentiments, which was consistent with a widespread view that management of National Parks was inadequate. They were commonly viewed as 'havens for feral animals with poor fire management', particularly those rarely visited by tourists. The graziers saw the lack of management of National Parks as defeating their purpose, with one feeling they were simply an approach to 'appease Green voters'. One expressed the view that National Parks have 'good people, but not enough of them' because they lack funds and suggested that National Parks 'could be run in partnership with landholders'. Private conservation groups were seen as more acceptable, though some graziers thought that the private conservation groups needed to own the land they wished to conserve. Others were 'happy with the collaborative stewardship concept'. One was of the view that 'we only lease country' and 'don't have the right to interfere with nature'.

¹This figure includes a couple who answered questions jointly and are therefore counted as one entity.

²One respondent owned one property but managed a second; so is counted as both an owner and a manager.

Table 2. Landholder attitudes to threatened species management

Issue	Attitude	No. of responses
Responsibility for managing threatened species on private land	Government only	2
	Landholder only	1
	Joint	14
	Other	1
	No response	0
Responsibility for cost of managing threatened species on private land	Government only	12
	Landholder only	0
	Joint	5
	Other	1
	No response	0
Government management of threatened species on National Parks	Positive	1
	Negative	7
	Unknown	10
	No response	0
Government management of National Parks (overall)	Somewhat positive	4
	Negative	12
	Unknown	2
	No response	0
Government management of threatened species off-park conservation programs	Positive	0
	Negative	2
	Unknown	16
	No response	0
Role for private conservation organisations	Yes	10
	No	2
	Maybe	2
	No response	4

Some graziers (7) had known about night parrots for a long time (1990 or earlier), mostly from hearing that people were looking for them. Most (11) heard about the rediscovery of night parrots by John Young (Koch 2013), sometimes through local media, particularly radio (5 people) when it was announced. For a few (3) the survey itself was the first they knew about the species. Nine people thought they would recognise a night parrot if they encountered one, mostly because they were familiar with other species on their property. One woman thought she had seen night parrots – two green parrots that had flown off the ground out of spinifex. Everyone who knew of the bird was also aware of its association with spinifex.

While few people knew of the night parrot project, which was just starting at the time of the interviews, all but three landholders were completely accepting, in principle, of research occurring on their property (Table 3), though details of any potential research were not discussed. One felt research or surveys were ‘one of those sort of things come back to haunt the landholder, when you cooperate you end up being the meat in the sandwich’. Another was cautious at this stage because he felt he knew too little. Few expected anything in return except common sense (‘leave gates as you find them’) and ‘general courtesy’. Just one wanted ‘compensation depending on what’s involved and the impact on our grazing enterprise’, but another asked ‘do you have to expect something?’. Most graziers would want to keep secret any encounters with night parrot on their property. Some wished to remain anonymous because they feared disturbance of their cattle, that they might be compulsorily acquired by the State, or that there might be public liability

Table 3. Landholder attitudes to night parrot research

Issue	Attitude	No. of responses
Knowledge of night parrot project	None	12
	Very little	3
	Some	2
	No response	1
Willing to allow access for night parrot research/surveys	Yes	15
	No	1
	Maybe	2
Desire to remain anonymous and keep location secret if night parrots found	No response	0
	Yes	13
	No	1
	Maybe	4
	No response	0

Table 4. Landholder attitudes to Night Parrot habitat management

Issue	Attitude	No. of responses
Knowledge of night parrot habitat	Nothing	5
	A little	4
	Some	8
	No response	1
	Yes	12
Willingness to change stock management to improve habitat of an area of spinifex country if night parrots were found	Yes	4
	No	2
	No response	0
Willingness to change stock management of spinifex country if paid for projected lost production	Yes	7
	Maybe	6
	Not applicable/ no payment required	1
	Not asked	4
Willingness to consider fencing to exclude cattle from spinifex country for night parrot conservation if paid for projected lost production	Yes	5
	Maybe	3
	Not applicable/ no payment required	1
	Not asked	9

implications; others were concerned the birds themselves might be disturbed. Just one was keen to share the location so that it could complement other conservation or research activities.

Most people knew at least a little bit about night parrot habitat, and all respondents who commented on night parrot habitat named spinifex as an important habitat. Most people were at least willing to consider changing their cattle grazing practices for the sake of the night parrot. A number commented that the spinifex country where the night parrots are thought most likely to occur is rarely grazed by stock (Table 4). The two respondents most reluctant to change practices were more willing to do so with the potential of compensation. Fencing to exclude cattle from night parrot habitat was also generally acceptable, though one interviewee was concerned about stock perishing against the new fence (as stock can do when a new fence is erected) and two stated explicitly that they would like such fences to be paid for and erected by others. People were reluctant to estimate an area they would be prepared to fence off for conservation but one manager of a property associated with a

Table 5. Landholder attitudes to dingoes and their control

Issue	Attitude or behaviour	No. of responses
General attitude to dingoes	Shoot on sight	13
	Tolerate	3
	Positive	2
	No response	0
Dingo control methods used ^A	Baiting	11
	Shooting	12
	Trapping	3
	Non-lethal	1
	No response	0
Willingness to modify dog baiting if night parrots were found	Yes	6
	Maybe	4
	No	3
Willingness to modify dog baiting if paid for projected stock losses or damage	No response	5
	Yes	6
	Maybe	6
	No response	6

^AMore than one answer possible.

Table 6. Use of fire by landholders

Reason for burning	No. who burn for this reason ^A
Improved grazing	6
Fire breaks	7
Fire fighting	14
Not applicable – do not burn	1
No response	0

^AMore than one answer possible.

mine, so not used intensively for pastoralism, volunteered that '50 or 60% of land area on this property not practical from a pastoral perspective,' and would 'consider any option that might complement conservation generally, subject to mine operation expectations'. Another was happy to have fencing 'as long as it didn't affect the productive Mitchell Grass country'.

There is potential for dingo management to contribute to night parrot conservation through the regulation of feral cats (Ritchie and Johnson 2009). Most graziers had a negative view of dingoes (Table 5). While one person viewed them as a native animal, for most they were unmitigated pests, killing calves and causing losses they estimated at up to \$75 000 a year in actual or opportunity costs. Though most (10) did not know the cost, three ventured losses of <AU\$10 000 and four ventured losses of >\$10 000. Most graziers killed dingoes on sight or through various control programs and were critical of neighbours if they did not contribute to dingo control. Indeed, one was prepared to have a low density of dingoes on his property because 'they helped keep 'roo numbers down a bit' and only participated in the annual shire wild dog baiting program to be a good neighbour and support the wider effort. Despite these attitudes, most of the graziers interviewed would be willing to reconsider their approach if night parrots were found on their property, especially if they were offered compensation. However, one

Table 7. Landholder attitudes to fire management

Issue	Attitude	No. of responses
Willingness to change fire management if night parrots found and require a different regime	Yes	9
	No	4
	No response	5
Willingness to change fire management if paid for projected losses in productivity	Yes	6
	No	5
	No response	7

Table 8. Landholder attitudes to tourism/birdwatching related to night parrots

Issue	Attitude	No. of responses
Tolerant of birdwatchers on property if night parrots found	Yes	6
	Maybe	6
	No	6
	No response	0
Previous involvement in tourism	Yes	2
	No	16
	No response	0
View tourism as a potential revenue source	Yes	2
	Maybe	3
	No	13
	No response	0

respondent described the idea as 'fairlyland – I don't think it's relevant as not many dogs will kill a cat' while another was worried about his popularity with neighbours.

Fire management, like dingo management, is also likely to be important for night parrot conservation. Within the study region, large single fire events are most common in the north, whereas in the south, expansive areas of naturally low or no-fuel habitats restrict the spatial impact of fires (S. Murphy, unpubl. data). Most of the graziers in the northern part of the study area use fire in their management, commonly putting in fire breaks to prevent the spread of fire or using it to induce 'green pick' for cattle (Table 6). Of those using fire, most would be sympathetic to changing the way they manage it if it would benefit the parrots, even without compensation (Table 7). The few who said they would not change their fire management did so only because they experienced it so rarely on their properties.

One potential source of income for properties with populations of night parrots is tourism, particularly birdwatchers hoping to see the birds. However, while most people were cautious about tourism for fear of stock disturbance and public liability, others would at least tolerate birdwatchers if they 'only came to see the bird and leave' (Table 8). Of the two who had had experience with tourism, only one might see it as a potential income source depending on its impact on liability. Neither of the two who could envisage tourism as a potential revenue source for the property had had previous experience in the industry.

In addition to the formal survey, several of the graziers offered additional information and opinions. One owner of three properties had already declared substantial nature reserves on two, another had fenced off rock-wallaby habitat and created an artificial swamp especially for waterbirds and a third set of three

properties also had nature refuges in less productive country such as that containing spinifex. Eight of the graziers, representing 18 of the properties, expressed positive comments about the birds such as 'I am interested in the night parrot and conservation more generally, please keep me informed', 'happy to help in any way we can' and 'hope they find them'.

Discussion

The survey revealed a high level of support for conservation of night parrots in the region. There was genuine pleasure among many of those interviewed at the thought that the birds might occur on their property, and certainly that they still existed. Even those owners who were not interested were willing to contemplate changing management should they be compensated adequately. While this group of landholders does not include all the sites where night parrots might occur in the region, and some of those who were unable to be contacted or unwilling to be interviewed may be less favourably disposed, the overall impression is that local support for conservation is high over a large part of western Queensland. This is in line with surveys further north on willingness to accept conservation payments for conservation (Moon and Cocklin 2011; Greiner 2014) and the long-standing attachment to place among graziers in rural Queensland (Everingham *et al.* 2014).

The graziers had comments pertinent to management of known major threats to the night parrot's persistence – overgrazing of the habitat by cattle, predation by feral cats, burning old spinifex – as well as on whether the parrots could contribute directly to their income through tourism.

Raising of beef cattle is the main form of income for all the properties interviewed. Cattle, however, are mostly grazed on flat lands supporting Mitchell grass. Spinifex, the principal roosting and breeding habitat of the night parrots, supports few cattle and many of the properties made little use of country supporting spinifex. Fencing to exclude cattle from spinifex therefore posed little problem for most graziers in the region, although several suggested that it may not be necessary because cattle rarely use the spinifex anyway. The few who use spinifex as a source of food during times of drought were still prepared to fence out cattle if they were paid appropriate compensation. Thus, while grazing has been a major source of biodiversity loss across northern Australia (Garnett *et al.* 2010), there is potential to reduce its impact on the night parrot on working cattle properties in western Queensland because the birds are thought to mainly occupy the least productive part of the landscape. It is important to note that should the parrots also be found to use non-spinifex habitat in this region, as suggested by Garnett *et al.* (1993), the attitudes to managing habitat for parrots may be less sympathetic.

During the day the night parrots shelter in large hummocks of spinifex that have not been burnt for many years. Analyses of satellite and aerial imagery for the areas currently occupied by the parrot could not find evidence of fire since 1956 (S. Murphy, unpubl. data.). Fires smaller than the pixel size detectable by imagery have certainly occurred (based on field observation), but rarely, and most of the area shows no fire scars. While fires in arid areas can cover very large areas after heavy rainfall (Allan and Southgate 2002), empirical evidence from satellite mapping

suggests that fires in western Queensland do not follow this pattern (S. Murphy, unpubl. data), mostly because of the expansive low- or no-fuel habitats that have already been mentioned.

Fire is used sparingly in the study area as a management tool, unlike in the savannas to the north. Even burning of fire breaks is not practised universally, presumably because fires, particularly large fires, are infrequent. As with grazing, therefore, there was general agreement that fire management could be changed for night parrots if thought necessary and that this would have little economic impact on the graziers.

In comparison to grazing and fire, dingoes and wild dogs elicited a very strong reaction. There are good data to suggest that the presence of dingoes benefits many threatened species (Wallach and O'Neill 2008). In the tropical savannas, the presence of dingoes in the landscape reduces the activity of cats, and potentially their absolute numbers (Kennedy *et al.* 2012), though there has been vigorous debate about the statistics used to support this research (Allen *et al.* 2015). There is also research showing that killing of stable pairs of adult dingoes allows country to be occupied by larger numbers of non-territorial dogs (Thomson *et al.* 1992). The belief among most graziers, however, was that dingoes kill many cattle, particularly calves, and cause substantial financial losses. Actual costs appear to vary greatly between properties, and do not closely correspond with their control strategies, but the issue generated the most animated answers of the issues discussed. While many properties may be willing to accept compensation for cattle losses from dingoes if that was thought the best way of protecting night parrots, there is evidently much greater need to provide strong evidence of benefit and the more cost-effective strategy may be ongoing control of feral cats by other means.

Tourism was initially discussed as a potential source of income rather than a threat. Bird tourism is a growing sector in the Australian tourism market (Steven *et al.* 2015) and tourism for biodiversity is commonly touted as a potential ecosystem service for which payments can be received (Balmford *et al.* 2009). However, many graziers saw tourism as a potential threat to either themselves or the parrots and there was little interest in using the parrots as a way of generating income from tourism. Birdwatchers may be tolerated on some stations but only if they do not disrupt the existing cattle grazing enterprise. As it is, most birdwatchers will want to see the target bird. However, even when researchers have known the exact location of roosts or nests, individual night parrots were difficult to observe (S. Murphy, pers. comm.). Furthermore, there is some evidence to suggest that disturbance at one roost area (associated with the recapture of a GPS tagged bird) caused the temporary relocation of three night parrots to an alternative roost site approximately 7 km away for about four weeks (S. Murphy, unpubl. data). Given that night parrots are difficult to observe and are known to move away from areas following disturbance, it seems that the species does not lend itself readily to eco-tourism.

Conclusions

Currently the social environment of the night parrot in western Queensland is largely supportive. The harsh environment in which the night parrot is currently known to persist, which has low productivity for cattle, and the limited use of fire by graziers,

suggests that conservation of the parrot will impose little economic cost to graziers. The potential for reducing dingo control so that they can control cats is more contentious, but not unsurmountable. Nevertheless both social and economic costs of changing dingo control strategies, including effects on reputation with neighbours if dingo control is stopped in night parrot habitat only, would need to be carefully weighed against the benefits of cat control, particularly if other means of cat control are likely to be effective. Tourism is unlikely to be welcomed by graziers, which may not matter as the species' secretive nature means it will not readily be seen by visiting birdwatchers.

This research provides the basis for discussions with graziers about a range of potential conservation arrangements for the species. Low confidence in State-funded National Parks to provide sufficient resources to manage the habitat makes this the least favoured option among those interviewed. Privately funded conservation seemed more acceptable, with conditions, while there seemed to be many opportunities for working with existing leaseholders to modify land management without necessarily changing tenure. It is unlikely, however, that night parrots will contribute greatly to the local economy through tourism.

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References

- Adler, J. H. (2008). Money or nothing: the adverse environmental consequences of uncompensated land use control. *Boston College Law Review*. *Boston College Law School* **49**, 301–366.
- Allan, G. E., and Southgate, R. I. (2002). Fire regimes in the spinifex landscapes of Australia. In 'Flammable Australia: the Fire Regimes and Biodiversity of a Continent'. (Eds R. A. Bradstock, J. E. Williams, and A. M. Gill.) pp. 145–176. (Cambridge University Press: Cambridge.)
- Allen, B. L., Allen, L. R., and Leung, L. K. P. (2015). Interactions between two naturalised invasive predators in Australia: are feral cats suppressed by dingoes? *Biological Invasions* **17**, 761–776. doi:10.1007/S10530-014-0767-1
- Australian Senate (2007). Conserving Australia: Australia's national parks, conservation reserves and marine protected areas. Environment, Communications, Information Technology and the Arts Reference Committee of the Australian Senate, Commonwealth of Australia, Canberra.
- Balmford, A., Beresford, J., Green, J., Naidoo, R., Walpole, M., and Manica, A. (2009). A global perspective on trends in nature-based tourism. *PLoS Biology* **7**(6), e1000144. doi:10.1371/JOURNAL.PBIO.1000144
- Ban, N. C., Mills, M., Tam, J., Hicks, C. C., Klain, S., Stoeckl, N., Bottrill, M. C., Levine, J., Pressey, R. L., Satterfield, T., and Chan, K. M. (2013). A social-ecological approach to conservation planning: embedding social considerations. *Frontiers in Ecology and the Environment* **11**, 194–202. doi:10.1890/110205
- Cary, J., and Webb, T. (2001). Landcare in Australia: community participation and land management. *Journal of Soil and Water Conservation* **56**, 274–278.
- Everingham, J. A., Collins, N., Rifkin, W., Rodriguez, D., Baumgartl, T., Cavaye, J., and Vink, S. (2014). How farmers, graziers, miners, and gas-industry personnel see their potential for coexistence in rural Queensland. *SPE Economics & Management* **6**, 122–130. doi:10.2118/167016-PA
- Fishbein, M., and Ajzen, I. (2011). 'Predicting and Changing Behavior: the Reasoned Action Approach.' (Taylor & Francis: New York.)
- Fitzpatrick and others vs Crown (1992). Claim for compensation – resumption for national park purposes. Land Court A94-44. http://www.courts.qld.gov.au/_data/assets/pdf_file/0008/273374/A92-44.pdf
- Garnett, S. T., Crowley, G. M., Duncan, R., Baker, N., and Doherty, P. (1993). Notes on live night parrot sightings in north-western Queensland. *Emu* **93**, 292–297. doi:10.1071/MU9930292
- Garnett, S. T., Woinarski, J. C. Z., Crowley, G. M., and Kutt, A. S. (2010). Biodiversity conservation in Australian tropical rangelands. In 'Can Rangelands be Wildlands?: Wildlife and Livestock in Semi-arid Ecosystems'. (Eds J. du Toit, R. Kock, and J. Deutsch.) pp. 191–234. (Blackwell Publishing: Oxford.)
- Greiner, R. (2014). Environmental duty of care: from ethical principle towards a code of practice for the grazing industry in Queensland (Australia). *Journal of Agricultural & Environmental Ethics* **27**, 527–547. doi:10.1007/S10806-013-9475-6
- Greiner, R. (2015). Motivations and attitudes influence farmers' willingness to participate in biodiversity conservation contracts. *Agricultural Systems* **137**, 154–165. doi:10.1016/J.AGSY.2015.04.005
- Kamal, S., Grodzińska-Jurczak, M., and Brown, G. (2015). Conservation on private land: a review of global strategies with a proposed classification system. *Journal of Environmental Planning and Management* **58**, 576–597. doi:10.1080/09640568.2013.875463
- Kennedy, M., Phillips, B. L., Legge, S., Murphy, S. A., and Faulkner, R. A. (2012). Do dingoes suppress the activity of feral cats in northern Australia? *Austral Ecology* **37**, 134–139. doi:10.1111/J.1442-9993.2011.02256.X
- Koch, T. (2013). Tweets in the night, a flash of green: is this our most elusive bird? *The Australian*, 29 June.
- Manfredo, M. J. (1989). Human dimensions of wildlife management. *Wildlife Society Bulletin* **17**, 447–449.
- Moon, K., and Cocklin, C. (2011). Participation in biodiversity conservation: motivations and barriers of Australian landholders. *Journal of Rural Studies* **27**, 331–342. doi:10.1016/J.JRURSTUD.2011.04.001
- Murphy, S. (2013). Night manoeuvres. *Australian Birdlife* **2**, 20–22.
- Murphy, S. (2014). Night parrot (*Pezoporus occidentalis*) research plan. Map IT and Fortescue Metals Group, Yungaburra, Queensland, and Perth, Western Australia.
- Pyke, G. H., and Ehrlich, P. R. (2014). Conservation and the Holy Grail: the story of the night parrot. *Pacific Conservation Biology* **20**, 221–226. doi:10.1071/PC140221
- Ritchie, E. G., and Johnson, C. N. (2009). Predator interactions, mesopredator release and biodiversity conservation. *Ecology Letters* **12**, 982–998. doi:10.1111/J.1461-0248.2009.01347.X
- Steven, R., Morrison, C., Arthur, J. M., and Castley, J. G. (2015). Avitourism and Australian important bird and biodiversity areas. *PLoS One* **10**, e0144445. doi:10.1371/JOURNAL.PONE.0144445
- Szabo, J. K., Khwaja, N., Garnett, S. T., and Butchart, S. H. M. (2012). Global patterns and drivers of avian extinctions at the species and subspecies level. *PLoS One* **7**, e47080. doi:10.1371/JOURNAL.PONE.0047080
- Thomson, P. C., Rose, K., and Kok, N. E. (1992). The behavioural ecology of dingoes in north-western Australia. III. Hunting and feeding behaviour, and diet. *Wildlife Research* **19**, 565–584. doi:10.1071/WR9920565
- Wallach, A. D., and O'Neill, A. J. (2008). Persistence of endangered species: is the dingo the key? South Australia Department for Environment and Heritage, Adelaide.