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Report

Hope for Resurrecting a Functionally Extinct Parrot or Squandered Social Capital? Landholder Attitudes Towards the Orange-bellied Parrot (*Neophema chrysogaster*) in Victoria, Australia

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Abstract

In early 2010, after 27 years of recovery effort, the orange-bellied parrot (OBP; *Neophema chrysogaster*) was expected to be extinct in the wild within a few years. Shortly before the imminent wild extinction became evident, we surveyed landholders (114 responses of 783 surveys delivered) in part of the main non-breeding area, according to three classes of modelled habitat suitability ('high', 'medium', and 'low'). Predictions of the habitat models appear to correlate with landholder perceptions of the presence of OBP habitat on private land, thus the models appear a tractable way to identify key stakeholders worthy of priority consultation in relation to habitat works. Landholders were sympathetic to wetlands and birds, including OBPs (89.4% were aware of OBPs). Most indicated that they would be upset if the OBP went extinct and agreed that critical habitat should be protected; 80.7% were prepared to consider changes to the way they managed their land to benefit the species, and sought more information on how they could do so (64.0%). This study suggests that the habitat model usefully identified key stakeholders and the OBP enjoyed high awareness, concern, and engagement among many stakeholders, shortly before the species was considered functionally extinct. The maintenance of landholder support is likely to be critical if future attempts are made to reintroduce the species to the wild.

Keywords: *Neophema chrysogaster*, orange-bellied parrot, landholder, social extinction cost, community engagement

INTRODUCTION

The orange-bellied parrot (OBP; *Neophema chrysogaster*) is listed as critically endangered under Australia's Environment Protection and Biodiversity Conservation Act (1999). The entire population breeds during the austral summer in an area of <4,000 ha in a remote wilderness site in southwest Tasmania. The birds migrate to ca. 90,000 ha of coastal mainland in southeastern Australia along ca. 2,000 km of coastline during the austral winter (OBPRT 2006). The OBP is a coastal specialist during its non-breeding period (>95% of observations are within 5 km of the coast), and the birds feed predominantly on coastal saline vegetation in low-lying, sheltered areas such as estuaries and coastal floodplains. These areas have been affected by the consequences of industrial, urban, residential, and agricultural development and been extensively cleared and degraded since European settlement. More recently, water over-extraction and drought have affected a substantial proportion of the species' non-breeding habitat (OBPRT 2006; Kingsford et al. 2011).

The recovery effort for OBPs is the longest running formal recovery programme for any threatened species in Australia (established in 1983) and involves multiple governments,

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a multi-institutional captive breeding programme, non-government organisations, and other experts. Much of the recovery effort in the species' non-breeding range has focussed on protecting habitat inside formal reserve systems. Recently, attention has turned to restoration of habitat outside formal reserve systems. Around one third of non-breeding OBP habitat is located on agricultural land (Ehmke 2009) where land management practices affect the presence and quality of habitat (OBPRT 2006). Thus, private landowners are key stakeholders.

When this study was commissioned in 2008, the wild breeding OBP population was reported as stable at '<150 individuals' (OBPRT 2006; BirdLife International 2008). By early 2010, a rapid decline to <50 individuals was revealed and extinction of the species in the wild in the near future appeared unavoidable; the latest models of wild birds at the only known remaining breeding location predict the species will be extinct in the wild by 2015 (OBPRT unpublished data); a sizeable captive population of 150–200 individuals exists.

Until now, there has been a general lack of information about the distribution of OBP habitat on private land, and landholder attitudes towards the OBP recovery programme remain unclear. As such, this study aimed to: 1) test the utility of recently developed models (Ehmke 2009) which predicted the potential occurrence of OBP habitat across land tenures, and which promised to offer a strategic approach to identifying landholders who managed land where habitat protection and restoration works could be usefully targeted; and 2) investigate landholder attitudes and knowledge of birds and wetlands in a key area of the species' non-breeding range with a view to informing on-ground management of the species, i.e. assess and direct the capacity for on-ground recovery actions on private land.

MATERIALS AND METHODS

The study area was ca. 52,000 ha of the Bellarine Peninsula (Victoria) (Figure 1). This area was chosen because predictive models (Ehmke 2009) indicated a large concentration of high relative probability of OBP occurrence in the area and because OBPs have been consistently observed in the region at a number of key sites (Starks et al. 1992; OBPRT 2006). Properties in the study area were identified by structures and boundaries featured in satellite images and their locations mapped in GIS before being stratified into three classes based on predictive habitat models. Predictive models (Ehmke 2009) were used to classify properties according to their modelled likelihood of containing OBP habitat. Properties were classified as having a 'low' probability of habitat occurrence as determined by a potential occurrence model (<0.5), 'medium' probability of habitat occurrence as determined by the potential occurrence model (>0.5), or 'high' probability of habitat occurrence (contained predicted optimal habitat) as determined by an optimal habitat model (see Ehmke 2009 for model details; Figure 1). Henceforth, these are termed 'zones'.

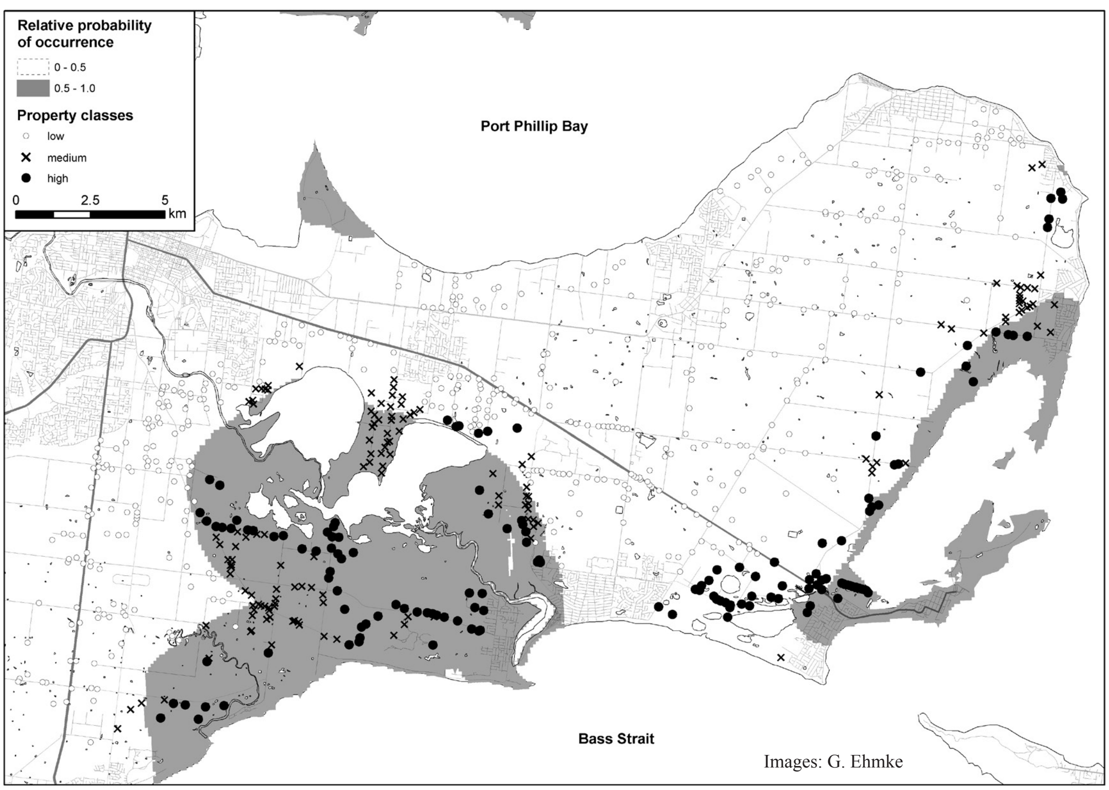

Figure 1
Study area and properties to which surveys were delivered.
Properties are classified as being in 'high', 'medium', or 'low' likelihood of occurrence of OBPs.

We distributed a 9-page, 31-question survey to non-urban landholders which addressed two major themes: 1) the perceived occurrence of potential OBP habitat ('perceived habitat') on a property, and 2) attitudes towards OBPs, their habitats, and management. We suggest that landowner perceptions of the occurrence of OBP habitat are likely to be highly accurate (the survey provided images of the specific vegetation type, i.e. coastal saltmarsh), as studies have shown many landowners have a high capacity to identify habitats and even species on their land (Lepczyk 2005; Knapp and Fernandez-Gimenez 2009). In particular, we acknowledge that some small habitat patches may have gone unreported by landholders, but treat their perceptions as an index of the occurrence of habitat.

Thirty survey questions were closed with options for open-ended responses where relevant (Dillman 2007; Miller 2009). Three questions, containing 20 attitudinal statements, asked respondents to agree or disagree on a 5-point Likert scale (1=strongly disagree; 3=neither agree nor disagree; 5=strongly agree) (Robson 2002). Surveys were hand-delivered to landholder addresses in October 2009, with pre-paid return envelopes and an invitation to participate in a random draw for a modest prize.

Means (±1 SE) are presented for summary statistics and attitudinal variable scores (Likert scale) and potential differences in attitudinal variables between property classes were compared with Analysis of Similarities (ANOSIM) using a Euclidian distance resemblance matrix in PRIMER version 6 (Plymouth Marine Laboratory, UK). Where positive and negative contentions existed in the attitude statements, the negatively aligned statements were reversed before multivariate analysis; this was not done for univariate statistics.

RESULTS

Of the 783 surveys delivered, 114 (14.6%) were returned; 25, 29, and 60 surveys were returned from the high, medium, and low zones respectively (broadly proportional to the number of surveys delivered to each zone). Surveys represented 114 properties (ca. 2395 ha; 21.2±4.1 ha, 0.1-311.0 ha).

Most respondents were male (61.9%); 93.8% of respondents were aged 35–84 years, of which most were 60–70 years old (30.7%); most respondents had technical (28.1%) or university education (53.5%) and were employed full or part time (53.5%) or retired (32.4%); a few respondents were members of natural history groups (3.5%). Family ownership of properties ranged from 9 months to 150 years (22.1±2.3 years, n=111). Most properties were actively used for agricultural, e.g., livestock (35.6%), hobby farms (29.5%), cropping (12.9%), and conservation purposes (22%). Only 4.4% of properties were solely dedicated to conservation, but 23.7% were involved in Landcare (diverse landholder groups that work to protect and restore land) and 9.6% were in a voluntary conservation agreement.

We assessed the utility of the habitat model by determining the reported occurrence of habitat (coastal saltmarsh) by landholders in different zones. The size of properties differed between zones (high: 39.0±9.7 ha; medium: 22.4±8.1 ha; low: 13.2±5.3 ha), thus property size was included as a variable in analysis. Reports by landholders of the presence of OBP habitat were significantly more likely to occur in the high zone (64% of properties), than in medium (39.2%) and low (13.3%) zones with property size having a marginal positive effect on the reporting of habitat (Table 1). Thus, predictions of the habitat model appear to correlate with landholder perceptions of the presence of OBP habitat on private land.

Our second aim was to examine landholder attitudes towards OBP conservation. Most respondents (89.4%) had heard of OBPs. Of these, 51% remembered hearing information about OBPs in newspapers, 47% from radio or television, 36% from word of mouth, 21% from land management agencies, and the rest through sources such as brochures, field days, community organisations, the internet, and notice boards (n=100). Landholders were concerned for the conservation of the species, indicating: 1) that they would be upset if OBPs became extinct (Likert scale: 4.24±0.08); 2) agreement with the contention that critical habitat for OBPs should be protected (4.10±0.07); and 3) moderately low levels of concern that the use of their properties would be constrained should OBPs be detected there (2.4±0.11). Most (80.7%) indicated that they would be willing to change the way in which they manage their land to support OBP recovery efforts or conservation of other endangered species.

Most landowners (77.2%) expressed interest in receiving more information regarding OBPs and land management strategies, with more than half of all respondents indicating a desire for specific information on land management changes they could make on their own properties and information on how to obtain free plants for revegetation works (64% and 50.9% respectively). There was no difference in attitudes towards OBPs between zones (ANOSIM, Global R=0.002, P=0.481). Landholders were generally positive when asked whether they would like to increase the cover of native trees or shrubs on their property (3.9±0.1) and indicated they were unlikely to clear native vegetation for productive or pest control purposes (1.97±0.14). There was no difference in attitudes towards native vegetation between zones (ANOSIM, Global R=0.013, P=0.344).

DISCUSSION

Almost two-thirds (64%) of private landholders in the high zone reported their perception of the presence of OBP habitat

Table 1

Logistic regression analysis of the reported occurrence of potential OBP habitat in the three modelled classes of habitat suitability (zones): high, medium, and low. Property size was a covariate.

Variable	*B*	S.E.	Wald	*P*
Zone	-1.143	0.289	15.642	0.000
Property size	0.010	0.005	3.529	0.060
Constant	1.410	0.665	4.494	0.034

on their properties. Conversely, the vast majority (86.7%) of landholders in areas unlikely to contain OBP habitat (the low zone) reported that they had no potential habitat on their properties. The utility of the model in identifying likely managers of important habitat therefore seems promising, though ground-truthing constitutes a sensible next step. Although the possibility of bias in respondents cannot be eliminated, our sample represents a broad cross-section of landholders in the region, i.e., from properties across zones and which were managed for non-conservation purposes such as primary production, and a breadth of demographic characteristics. We show that there exists at least a substantial number of property managers prepared to help the OBP and we suggest that our results can be extrapolated across the range of this species; high rates of landholder participation in active conservation and restoration programmes have featured in the study area and in other parts of this species range (e.g., over 75,000 OBP habitat plants have been planted on public and private land in southwestern Victoria in 2008–2010; Pritchard pers. comm. 2011).

There is an important distinction between intention and action (McKnight and Sutton 1994; Decker et al. 2001; Harding et al. 2009), and a high degree of controversy regarding wildlife conservation and the productive use of land (see, for example, referrals under the Environment Protection and Biodiversity Conservation Act, 1999). Results here are interesting in this context given the particularly high profile of OBPs in Australia in relation to land use planning. The OBP is one of Australia's highest profile threatened species and, for several decades, has been at the centre of many land use planning debates. There has been considerable negative media coverage (spuriously) scapegoating and blaming the species for blocking developments, preventing action on climate change, and compromising landholder ability to manage properties productively (Dooley 2008; Ehmke et al. 2008). Thus, it seems likely that landholders may be sceptical about or even hostile regarding the prospect of the species occurring on their land, given their previous exposure to negative messages about the species (most respondents heard of the species in newspapers, radio, or television—media which hosted the vast majority of the negative coverage). Given this overwhelming negativity in mainstream media, the strong level of apparent support by landholders is encouraging, if not somewhat unexpected. There is no empirical data to directly explain the origins of the observed attitudes, but two possibilities are likely. Firstly, the mainstream media coverage may have been dismissed or outweighed by respondents' generally positive attitudes to threatened species. People are often predisposed to helping endangered species (Cook and Cable 1996), and our results indicated that landholders were willing to consider actively changing land management practices to assist in recovery efforts for the species. Secondly, the recovery programme for the species has involved education, community engagement, and extensive on-ground works activities on private properties (Weston et al. 2003; Wolcott et al. 2008), and may have overcome the negative media and fostered positive attitudes. Whatever the explanation, it is clear that substantial social capital exists.

Community engagement is a critical element of modern threatened species recovery efforts, and such engagement provides enhanced social and political support, volunteers, and project sustainability (Mascia et al. 2003; Weston et al. 2003, 2006; Koss et al. 2009). Little is known about the way in which an extinction affects project participants, whether it enhances commitment to prevent further extinctions, or creates a sense of futility or frustration which might decrease the chance of further involvement or interest. Indeed, *solastagia*, the distress caused by human-induced environmental change, and which is exacerbated by the sense of powerlessness to prevent that change (Albrecht et al. 2007), may be experienced by participants. Whatever the effect, the question of how (or whether) to manage existing social capital is poignant. One option is to re-direct the social capital into broader conservation goals or to tackle key threatening processes responsible for the extinction of the focal threatened species; in the case of OBP, the loss and degradation of coastal and subcoastal wetlands (OBPRT 2006). These habitats are under intense pressure in Australia and harbour a broad range of other species. On the Bellarine Peninsula, planned residential expansion is set to grow by 16,388 dwellings (62%) in the next 20 years (City of Greater Geelong 2009). Only about 35% of coastal saltmarshes are in the Victorian reserve system (Ehmke unpublished data) and only recently has this vegetation type been formally described in Victoria. OBPs have unquestionably functioned as a flagship for this ecosystem (OBPRT 2006; Ehmke et al. 2008), thus the demise of the OBP might also represent a diminution in community advocacy for the protection of this habitat type. Other options for the management of social capital include contextualising efforts directed at OBP recovery in terms of high-level conservation goals, with a view to increasing the transportability of participant engagement between taxa and habitats. However, such approaches potentially diminish the personal connections made with focal taxa that presumably underpin the long-term volunteerism evident in OBP recovery (Wolcott et al. 2008).

Given the current projections that the OBP will be extinct in the wild by 2015, the following questions are now relevant: 1) how will landholders, many of whom responded to the survey in a manner which suggests they support recovery efforts, respond to the news that the OBP is functionally extinct; and 2) can or should existing social capital for OBPs be harnessed for either reintroduction or other conservation outcomes? The social costs of extinctions are little documented but likely to be profound (van Dooren 2011). Many Australian recovery teams rely heavily on volunteers and the community, and most focus on single species (Weston et al. 2003). Few, if any, single species recovery plans consider the long-term ramifications to their supporters of failing to recover a species, indeed recovery teams would generally cease to exist after extinction of the focal taxon, and presumably support and stakeholder networks would unravel. Exceptions include general support networks (for example, see Weston et al. 2003) or multispecies recovery teams. With extinctions predicted to increase (Dickman et al. 2007), and the public becoming integral to the delivery of many recovery efforts, strategies to deal with the social implications in the wake of extinctions warrant consideration when planning for biodiversity conservation.

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