

# Short Communications

## Ground Parrots and Fire at Barren Grounds, New South Wales: A Long-term Study and an Assessment of Management Implications

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The Ground Parrot *Pezoporus wallicus* (Kerr) is a cryptic, terrestrial species unique among Australian parrots. Its habitat, which is sedgeland or heathland, must provide adequate food and cover and suitable roosting and nesting sites. There is wide geographical separation of current Ground Parrot populations with considerable variation in the vegetation characteristics among sites (Meredith 1984). Fire is recognised as a profound natural feature of many vegetation types in Australia and heath is notoriously fire-prone (Recher 1981). However, no single fire regime, whether natural or prescribed, is typical of all the areas in which Ground Parrots currently occur.

A problem with collecting data in fire prone areas is the paucity of habitats of older fire age (the amount of time since fire last occurred). In the past there have been recommendations for prescribed burning of Ground Parrot habitat. These have been based on estimates of population density of Ground Parrots made for sets of sites of various fire ages rather than replicated long-term studies of bird densities in burned sites followed for many years. Jordan (unpubl.) argued for a fire frequency of 8-10 years at Barren Grounds Nature Reserve based on a single site with fire age 14 years, that did not appear to support Ground Parrots.

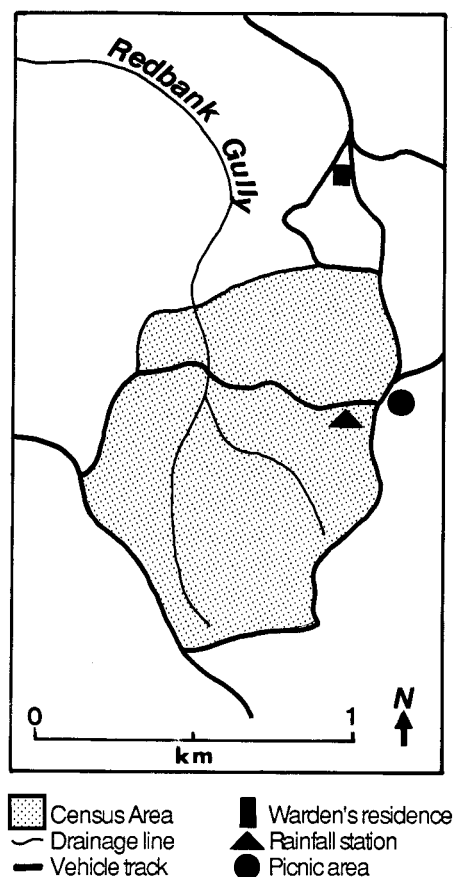
McFarland (1989) presented Ground Parrot population data for Queensland using 194 surveys from 120 sites. Ground Parrots were observed during 107 of the surveys. In older heathland, with fire ages from 11-13 years, six out of 12 sites supported Ground Parrots. He recommended a minimum fire-free interval of 8-10 years. Meredith & Isles (1980) described the suitability of habitat for Ground Parrots in Victoria. They found Ground Parrots present at 24 out of 67 survey sites. In heath with fire age less than 20 years Ground Parrots were present at 22 out of 58 sites and population densities were calculated using the results from only these 22 sites. In heath with fire age of 20 years or more,

Ground Parrots were present at two out of nine sites. These two sites were disregarded and the Ground Parrot density was assumed to approach zero after 20 years. They recommended that *Casuarina* heaths be burned every 8-12 years and *Xanthorrhoea* heaths every 12-16 years.

By contrast, in Tasmania, Bryant (1991) obtained Ground Parrot density data for 126 sites of fire age up to ten years and 59 sites with fire ages from 11 to 90 years. Based on the abundance of the species Bryant (1991) did not recommend prescribed burning 'as yet'. For south-western Western Australia, Burbidge *et al.* (1989; 1990) recommended complete fire exclusion from areas of known *P. w. flaviventris* habitat because the sparse data indicated that this subspecies persists in long unburnt areas.

The Ground Parrot has survived throughout this century in the areas that are now the Budderoo National Park and Barren Grounds Nature Reserve despite a haphazard mix of wildfires, deliberate frequent burning to promote 'green pick' for grazing cattle and prescribed burns. Barren Grounds Nature Reserve, near Jamberoo, New South Wales (34°40'S, 150°45'E), was originally gazetted for the purpose of preserving the habitat of the Ground Parrot and the Eastern Bristlebird (Anon 1962). In November 1968, all but four hectares of Barren Grounds was burnt by a wildfire. Forshaw, Fullagar & Groves (unpubl.) produced the first of numerous plans and papers (summarised in Baker & Clarke unpubl.) that discussed management of the Reserve and ways of averting future such catastrophes. In the past, management appears to have been guided by the presumption that heathland becomes unsuitable as habitat for Ground Parrots a number of years after fire.

In January 1983, a wildfire burned a substantial part of Barren Grounds Nature Reserve. Within this burned portion, a Ground Parrot census area was defined in the vicinity of 'Redbank Gully' (Jordan 1984). This is



**Figure 1** Redbank Gully census area, from 1:25000 topographic map (Kangaroo Valley 9028-4-S).

shown in Figure 1. Since 1983, annual (usually spring and autumn) censuses have been conducted and data collected continuously for almost eleven years.

The aims of this paper are to present and evaluate the Redbank Gully census data and to consider their implications to the management of Ground Parrots at Barren Grounds Nature Reserve.

## Methods

The size of the census area was recalculated to clarify discrepancies among the earlier records of Jordan (1984), Jordan (1987) and Bramwell & Bramwell (1990). The census area was digitised from the 1:25000 topographic map (Kangaroo Valley 9028-4-S) using the Geographic Information System E-RMS which calcu-

lates area using a least squares plane with 20 metre grid cells (NPWS undated). This confirmed our manual calculation that the census area is 80 hectares.

The Redbank Gully area was censused regularly from 1983 to 1993 using a searching area count. A straight line of 'beaters' (usually fewer than 40) spaced about 10 m apart proceeded slowly and noisily through the census area counting the Ground Parrots that were flushed. To minimise double counting, the place where each flushed bird landed was noted and if a bird was flushed again from that vicinity it was not counted.

From 8 September 1990 to 21 April 1992, data were also recorded for opportunistic sightings of Ground Parrots outside the Redbank Gully census area but within the Reserve. These data were collected by one of the authors, NPWS staff and researchers familiar with the Ground Parrot.

## Results

The Redbank Gully census results are shown in Table 1. Redbank Gully was last burned in January 1983 and immediately following the fire there were no Ground Parrots in the census area. The date and number of Ground Parrots counted on each census were recorded and the fire age of the census area was calculated. Also, the density of Ground Parrots per 10 ha was calculated taking the census area to be 80 ha. For the census conducted in March 1992, there were a large number of 'beaters' (approximately 75) spaced at 10 m or closer. This may have contributed to the large number of Ground Parrots counted.

For the period of opportunistic data collection, there were 15 sightings of Ground Parrots in heath with fire ages from 9.3 to 12.4 years. Furthermore, in 1993, Ground Parrots were heard calling from the heathland east of the 'Lodge', an area that was last burned in October 1980. However, sightings are rare due to the cryptic nature of the species, the thick cover of their habitat and because of NPWS policy that people remain on made trails.

## Discussion

### Census data

The census method presumes that all Ground Parrots are flushed at least once and that the 'beaters' can determine which birds are flushed more than once so that these are not double-counted. Using radiotelemetry,

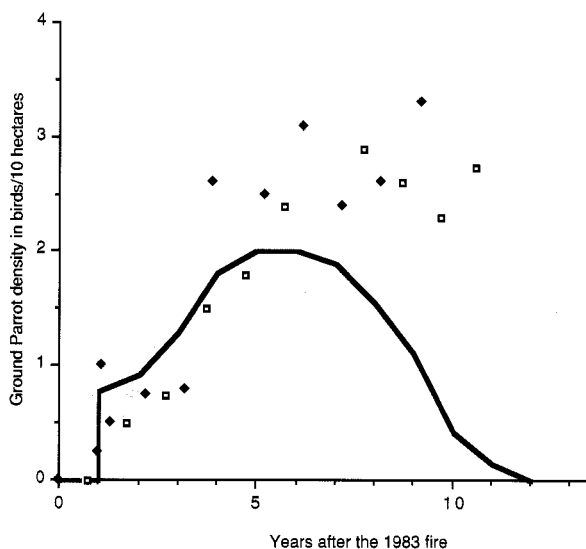
**Table 1** Census of Ground Parrots at Redbank Gully, 1983–93.

Date	No. of Ground Parrots	Years since fire	Birds per 10 ha
January 1983 – fire	0	0	0
September 1983	0	0.7	0
January 1984	2	1.0	0.25
February 1984	8	1.1	1.0
May 1984	4	1.3	0.5
September 1984	4	1.7	0.5
March 1985	6	2.2	0.75
September 1985	6	2.7	0.75
March 1986	7	3.2	0.8
September 1986	12	3.7	1.5
December 1986	21	3.9	2.6
September 1987	14	4.7	1.8
March 1988	20	5.2	2.5
September 1988	19	5.7	2.4
March 1989	25	6.2	3.1
March 1990	19	7.2	2.4
September 1990	23	7.7	2.9
March 1991	21*	8.2	2.6
September 1991	21**	8.7	2.6
March 1992	26	9.2	3.3
September 1992	18	9.7	2.3
September 1993	22	10.7	2.8

\* Estimate based on 14 birds counted within 67% of the census area. \*\* Estimate based on 17 birds counted within 80% of the census area.

A.H. Burbidge (pers. comm.) found that it was sometimes possible to approach to within 10 m of a bird without flushing it and McFarland (1991a) reported that the majority of birds (84%) flushed only once or twice, after which they either remained perfectly still or they ran away through the heath faster than people could pursue them. During a census, thicker, taller heath prevents 'beaters' from maintaining their ten metre spacing and straight line. Presumably, these conditions would allow some birds to avoid being flushed. Conversely, a large number of closely spaced 'beaters' may result in a more thorough search. Hence, it is acknowledged that the technique is likely to produce census data that provide an imprecise population estimate not an absolute count.

The census data pertain to a single area for which no other ecological data are available. Consideration



**Figure 2** Redbank Gully census data summer–autumn (♦) and winter–spring (□), compared to Jordan (1987) (solid line).

needs to be given to the establishment of another census area within the Reserve to provide replication. However, to make valid comparisons between areas, it would be necessary to consider factors such as the character of the regenerating vegetation and the availability of Ground Parrot recruits to colonise regenerating habitat. The considerable effort needed to organise and conduct biannual censuses using the searching area count method is also a factor which needs to be addressed. Regular censusing using the listening method described by Bryant (1991) may provide adequate data for replication of the study.

### Management

Regarding the presumption that habitat becomes unsuitable for Ground Parrots beyond a certain fire age, Forshaw, Fullagar & Groves (unpubl.) suggested the implementation of a program of burning at Barren Grounds that depended on the development of the vegetation. This suggestion appears to be based on few field data, however, it is qualified by the suggestion that the Ground Parrot population should be monitored regularly. The prescription was quantified as a 12 years burning cycle by Morris (unpubl.), 6–8 years by Howard (unpubl.) and 8–10 years by Jordan (unpubl.).

Descriptions of Ground Parrot population density compared to fire age of vegetation fit one of two general models. The first predicts that heath left unburnt will

become unsuitable as habitat after some years and the population will decline to zero (Meredith & Isles 1980; Meredith *et al.* 1984; Jordan 1987; McFarland 1989; Meredith & Jaramovic 1990; Forshaw, Fullagar & Groves unpubl.). The second indicates that Ground Parrots remain in long unburnt heath (Burbidge *et al.* 1989, 1990; Bryant 1991). It could be argued that the second model is a modification of the first, with an extended time period and an undefined end point. However, if management of Ground Parrot habitat is to be guided by a population density model then there should also be cognisance of actual population densities in the areas being managed. Conducting regular listening censuses is one way that this might be achieved.

Contrary to the prediction of Jordan (1987), the census results for Redbank Gully demonstrate a high density of Ground Parrots in habitat with fire age greater than ten years (Fig. 2). The sightings outside the census area confirm the presence of Ground Parrots in older habitats up to 12.4 years after fire. The results are not sufficiently long-term to conclude that Ground Parrot numbers at Redbank Gully fit either of the population density models.

Some important implications can be drawn from these results. First, some parts of Barren Grounds with fire age ten years and more can support Ground Parrots. Second, prior to any management burn prescribed to 'ensure areas of prime habitat for Ground Parrots' (pp. 8-9 of NPWS 1986), an assessment of their status in that area should be made. If there are Ground Parrots in an area then the need for a prescribed burn should be reviewed in terms of their density in that area. Third, it is possible that Ground Parrots may persist in the Redbank Gully area for many more years without the habitat being burnt. Furthermore, in the recovery of vegetation after fire, vegetation characteristics are important in determining Ground Parrot density, not fire age *per se* (Meredith *et al.* 1984; Burbidge *et al.* 1989; McFarland 1991b).

The census data presented above were collected voluntarily and with an enormous effort. Only now can the value of that effort begin to be realised. It is now possible to collect census data at Barren Grounds for Ground Parrot habitat of fire age greater than ten years. With the exception of one site reported by McFarland (1989), earlier studies in other areas have collected data in a restricted time frame from a number of sites with different fire ages to deduce the nature of the relationship between fire age of habitat and Ground Parrot density. A problem with interpreting such data is accounting for

the between site variability of factors other than fire age. The need for long-term studies is widely recognised (Meredith & Isles 1980; NPWS 1986; McFarland 1989; Bryant 1991; Baker & Clarke unpubl.; Jordan unpubl.; Whelan unpubl.). Hopefully, fire will be excluded from Redbank Gully and regular censusing will continue for at least another ten years.

## Acknowledgements

Cooperation between the New South Wales National Parks and Wildlife Service (NSW NPWS) and the RAOU in the establishment and continuation of the Bird Observatory at Barren Grounds Nature Reserve facilitated Ground Parrot research at the Reserve. Previous Wardens of the Observatory, Pat and Richard Jordan and Mick and Jacqui Bramwell, organised the regular censuses and the 'beaters' and we acknowledge their effort in collecting data from 1983 to 1990. Copies of the references cited in this paper as 'unpubl.' are held in the Nowra office of NSW NPWS. Sally Bryant, Allan Burbidge, Peter Cale, David McFarland, Les Mitchell and Ian Smith provided helpful discussions and/or comments on earlier drafts of this paper. Sophie David prepared Figure 1.

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## 1998 INTERNATIONAL ORNITHOLOGICAL CONGRESS XXII

The XXII International Ornithological Congress will be held in Durban, South Africa, from 16–22 August 1998. The following officers were elected in Vienna: Honourary President, Tso-Hsin Cheng; President, Professor Peter Berthold; Vice President, Dr Janet Kear; Secretary, Professor Walter J. Bock. Dr Aldo Berruti, Department of Ornithology, Durban Natural Science Museum, Durban, South Africa, was appointed Secretary General for this Congress.

The Scientific Program Committee for the Congress has been appointed under the Chairmanship of Dr Lukas Jenni, Swiss Ornithological Institute, CH - 6204 Sempach, Switzerland (Fax number +41-41099 40 0-7; from 4 November 1995: +41-41-462 97 10) and includes the following members: C.J. Bibby, UK; C.J. Brown, Namibia; A. Chandola-Saklanu, India; T.M. Crowe, South Africa; D.G. Homberger, USA; A.P. Møller, Denmark; A.J. van Noordwijk, The Netherlands; Y. Ntiamoa-Baidu, Ghana; V.A. Payevsky, Russia; F. Spina, Italy; L.G. Underhill, South Africa; J.C. Wingfield, USA, in addition to the President, the Secretary General and the Secretary. This Committee will meet in Durban in early October 1995 to plan the scientific program for the XXII Congress including plenary speakers, symposia and their convenors. If you have any ideas and suggestions for the program, please send them to Lukas Jenni as soon as possible.

If you would like to propose a symposium, please provide the following information to Lukas Jenni as soon as possible, but no later than 31 August 1995: title of the symposium, two convenors (you can propose yourself), a short statement (less than one page) outlining the overall subject to be covered, a list of possible speakers with titles or topics for each talk (5 talks per symposium). Symposia are intended for the general ornithologist rather than the specialist. Therefore, speakers should give review papers on recent developments in the field integrating ideas and findings, rather than talks on a single specialised study. Convenors should try to obtain an international representation of speakers and a broad coverage of the subject of international relevance. Symposia proposals for the last congresses were more than those available in the timetables and it is important that proposals are clearly presented to the Committee. If a person agrees to convene a symposium, or to give a talk, he/she is committed to attend the Congress. A person can contribute as a first author to only one symposium talk.

Round Table Discussions are for discussion between specialists and are not to be used for a formal series of presented talks. Applications for Round Table Discussions will be requested later in the general congress brochure. Questions about the scientific program may be directed to any officers or any member of the Scientific Program Committee.

This Congress will include a full scientific program and many ornithological tours to numerous areas within southern Africa. All interested ornithologists are invited to take part. Potential attendees are requested to contact Dr Aldo Berruti (Durban Natural Science Museum, PO Box 4085, Durban 4000, South Africa) to be placed on the mailing list, or to provide suggestions on any aspect of this Congress. Persons on the mailing list will be sent information on all aspects of the Congress in proper time.