

A BANDING STUDY OF THE GREY GRASSWREN *Amytornis barbatus barbatus* IN THE CARYAPUNDY SWAMP OF SOUTH-WESTERN QUEENSLAND

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Grey Grasswrens *Amytornis barbatus barbatus* were studied in an 11 hectare area of tall, dense Lignum *Muehlenbeckia cunninghamii* in the Caryapundy Swamp of south-western Queensland between 1984 and 1996. One hundred and ninety-three individuals were captured and banded and 35 (18.1%) individuals were retrapped a total of 46 times. A pair of grasswrens with two recently fledged chicks were observed and later captured in an isolated stand of Lignum approximately 0.5 hectares in area. Most grasswrens were captured during periods of drought, suggesting that the species congregates in prime habitat refuge areas during periods of climatic extreme. The greatest threat to the Grey Grasswren appeared to be habitat destruction by introduced feral and domestic herbivores. Preservation of tall dense Lignum that offers food and shelter to support a high density of Grey Grasswrens during drought is crucial to the conservation of the species.

INTRODUCTION

Few studies of the Grey Grasswren *Amytornis barbatus* have been undertaken (Rowley and Russell 1997; Higgins *et al.* 2001). The original observation and collection of the species was from the Caryapundy Swamp of the Bulloo River overflow region of north-western New South Wales and south-western Queensland (Favaloro and McEvey 1968). Most subsequent records have been of *A. b. diamantina* of the Diamantina River, Cooper Creek and lower Eyre Creek systems of south-western Queensland and north-eastern South Australia (Robinson 1973; Cox 1976; McAllan and Cooper 1995).

The present study began in 1984 when, during a visit to a site on the edge of the Caryapundy Swamp, a population of the nominate subspecies of the Grey Grasswren *A. b. barbatus* was observed. The objectives were to study the morphology of the species and the dynamics and habitat of this population and the threats to it.

STUDY AREA AND METHODS

The Bulloo overflow region is a swampy floodplain dominated by Lignum *Muehlenbeckia cunninghamii* in the 'Channel Country' biogeographic region of the arid interior of Australia. The study site was on 'Pyampa' cattle station in south-western Queensland (28°55'S, 142°13'E), about 65 kilometres north-east of Tibooburra, New South Wales.

The average annual rainfall for the region is approximately 225 millimetres and the mean daily temperature ranges from approximately 5–18°C in July to 21–36°C in January, but daily maximum temperatures throughout the year frequently exceed 30°C. In the months October to March temperatures regularly exceed 40°C in the shade (Bureau of Meteorology figures for Tibooburra).

The prevailing climatic conditions for each year were assessed as dry, normal or wet and periods of declared drought were recorded. The nearest Australian Bureau of Meteorology weather station to the study site was in Tibooburra, 65 kilometres south-west of the study site. The records of temperature and rainfall from this weather station were regarded as indicative of the prevailing weather patterns for the study site. The Milparinka Rural Lands Protection Board District of New South Wales, which covers the north-western region of New South Wales only 7 kilometres south of the study site, monitors prevailing climatic

and landscape conditions for the purpose of determining periods of 'official' drought for government purposes. The declared drought periods for north-western New South Wales were indicative of the prevailing weather conditions at the study site.

The study site comprised approximately 11 hectares of Lignum 1–2.5 metres high, interspersed with Samphire *Halosarcia pergranulata*. The site included 8 hectares of dense tall Lignum (1.5 to 2.5 m high) to 3 hectares of patchy large dense clumps of medium to tall (1–1.5 m) Lignum.

An extensive area of Swamp Canegrass *Eragrostis australasica* and Old Man Saltbush *Atriplex nummularia* interspersed with large individual clumps of Lignum, adjoined the northern edge of the study site and gibber plain adjoined the western side. *Acacia* and *Eucalyptus* trees up to 4 metres high lined a shallow dry watercourse on the south-western edge of the site. About 6 hectares of low (<1 m) scattered Lignum on the southern and south-eastern limits of the study site gave way to sand dunes to the south and east.

Because of the isolation of the site (a two-day drive from Sydney, New South Wales where the researchers lived and 65 kilometres from the nearest town, Tibooburra), visits to the study site were short (1–4 days) and irregular. I made nine visits to the site: August 1984, September 1985, September 1988 (twice), July 1990, September 1991, August 1992, August 1994 and April 2000. Data are included from three additional visits made to the study site by Alan Leishman in October 1991 and July 1992 and by Rudy and Rebecca Jacobs in April 1996.

Mist nets (31 mm-mesh) were set in lanes among clumps of Lignum. Nets varied in height from one to four shelves (0.7 m to 2.7 m high) depending upon the height of the surrounding Lignum. We did not use a constant number of nets and did not always use the same net lanes. When opportunities arose we attempted to herd birds towards nets.

Grey Grasswrens tend to hop or run along the ground, often while flapping their wings, when moving between clumps of Lignum and as a consequence, almost all birds were captured in the bottom shelf of nets. Initially, nets were set with the bottom shelf string about 15 centimetres above ground level to allow the bottom pocket to dangle almost to the ground, but a number of grasswrens were observed to pass under the shelf string and did not get entangled in the dangling loose net. Therefore, after 1988 we changed the net-setting technique by placing the bottom shelf string on the ground. We first swept the net lanes free of sticks and clumps of dried earth, using a plastic lawn rake, and then erected the net with the bottom shelf string lying on the ground. Birds that hit the lower section of the net then had the net collapse over and behind them thus reducing the possibility of their escape. After adopting this netting method, the grasswren capture-rate appeared to increase, but so did the regularity of catching rabbits

Oryctolagus cuniculus and Shingle-back lizards *Trachydosaurus rugosus* which were both common in the area.

Nets were opened each morning soon after first light and were generally closed by 1000 hrs when the air temperature increased (>25°C) and the nets were in direct sunlight. During the first few days of the study we re-opened nets about two hours before sunset, but found that we caught more rabbits than we did birds resulting in severe damage to nets. Thereafter, we restricted netting to mornings.

Most birds were sexed by examination of a combination of characteristics of the facial plumage (males have wider and more distinct black lines on the face and throat than females — see illustrations on page 145 in Schodde (1982) of a female (top) and male (bottom) *A. b. diamantina*; also, the illustrations on page 144 is a female and page 146 is a male. These illustrations are also typical of the sexes of *A. b. barbatus*) and breast plumage (males have uniform streaking across the breast, the markings on females are less extensive and fainter toward the centre of the breast — see Higgins *et al.* 2001), and in some cases by cloacal shape. Measurements made of birds during this study followed those techniques described in Lane (1974). All grasswrens captured were examined for body, wing and tail moult.

Observations on the condition of the habitat were noted during each visit to the site.

RESULTS AND DISCUSSION

The remote location and inhospitable climatic conditions made this an arduous study. The very hot and dry conditions of the arid zone, and probably the habitat degradation, appear to strongly affect the bird diversity of the area. The abundance of Grey Grasswrens was highly variable and in some years it was very low. For example, in a two-day visit to the site in 1990, only one grasswren was caught and during the one-day visit in 2000 no grasswrens were located. The abundance and species richness of other birds was low in the Lignum (see Table 2). For example, in 1994 we captured 82 individual grasswrens, but only 12 birds of other species. The non-target birds trapped in the Lignum with the Grey Grasswrens during the project are shown in Table 2.

Day temperatures in the winter months often exceeded 30°C and by early October daily maximum temperatures often exceeded 40°C. Apart from the high temperatures, rabbits were caught in and severely damage nets, so trapping was restricted to a few hours in the morning when rabbits could be frightened into staying in their burrows. In the late afternoon, rabbits emerged from their burrows to forage. Since they could not be encouraged to return to burrows, they were a serious problem in low-set nets.

Grey Grasswrens were only detected in the 11 hectares of medium to tall dense lignum, so trapping effort was restricted to this area. We captured and banded 193 individual Grey Grasswrens and 35 (18.1%) individuals were retrapped a total of 46 times. Twenty-three of these retraps were of birds banded on a previous visit to the study site.

The longest recorded period between banding and recovery was three years 7 days (031-18164 banded 24 Sept 1988 and retrapped 1 October 1991). One other bird was retrapped more than 3 years after banding, one more than 2 years 10 months and 13 others more than 1 year 11 months. Results across the years are shown in Figure 1.

The measurements that we recorded for the sexed birds are shown in Table 1. There was so much overlap in these that the birds could not be sexed by size differences.

Moult in Grey Grasswrens is poorly known (Higgins *et al.* 2001). Early moult of primaries one and two was recorded on two birds captured in early October 1991. No moult was detected on birds captured on other visits that were in the months of July, August, September and April. This supports other studies that have suggested moult in adults occurs once per year, post breeding season, usually between October and December (Schodde 1982; Higgins *et al.* 2001).

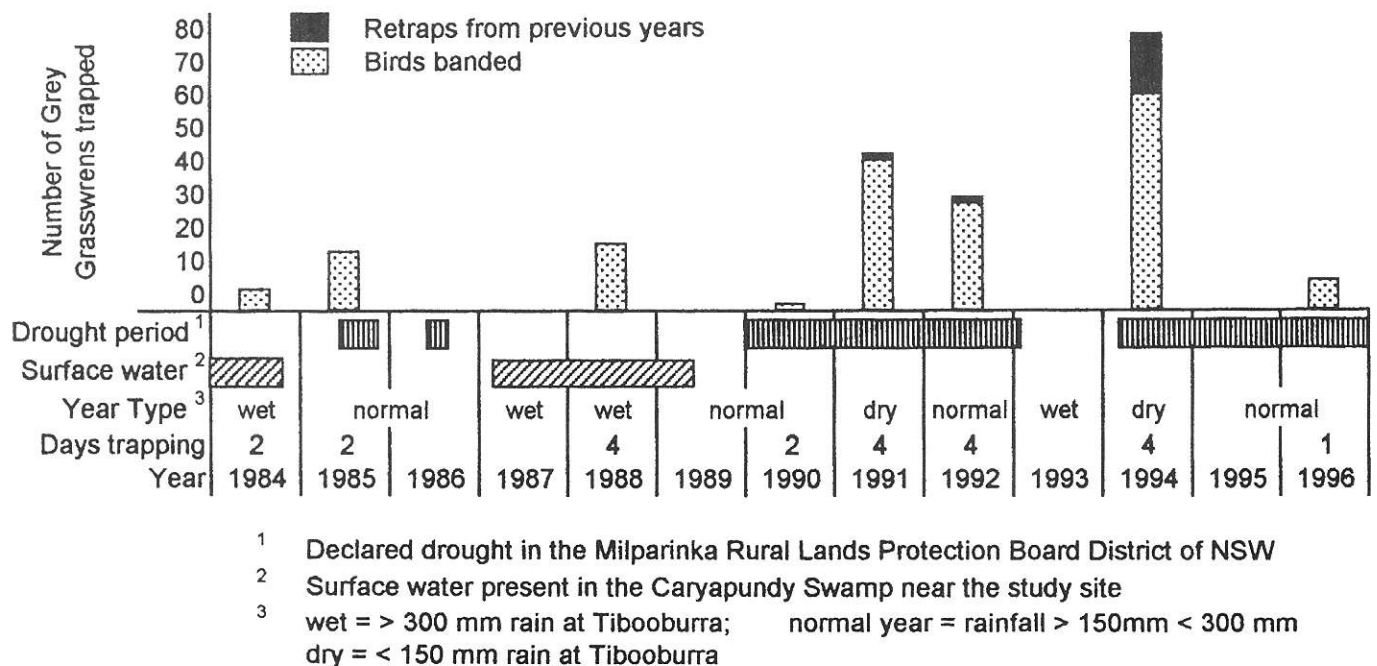


Figure 1. Grey Grasswrens captured in each year showing the prevailing climatic conditions throughout the period of the study.

TABLE 1
Measurements of male and female *Amytornis barbatus barbatus* banded at 'Pyampa' Station.

	Male (range; mean; SD; SE; n)	Female range; mean; SD; SE; n)
Weight (g)	15.5–21.5; 18.7; 1.35; 0.17; 68	15.0–21.0; 17.9; 1.26; 0.13; 93
Head-bill (mm)	30.0–33.0 ; 31.6; 0.76; 0.09; 72	29.5–32.8; 31.2; 0.86; 0.09; 90
Wing length (mm)	52–65; 60.1; 2.24; 0.27; 71	50–65; 58.7; 2.38; 0.25; 91
Wingspan (mm)	181–208; 193.9; 5.10; 0.62; 67	173–203; 189.5; 5.35; 0.58; 87
Tail length (mm)	99–122; 111.3; 5.02; 0.61; 68	87–121; 106.6; 7.43; 0.80; 8

TABLE 2
All birds captured during the study.

	Species	Number captured
Variagated Fairy-wren	<i>Malurus lamberti</i>	29
White-winged Fairy-wren	<i>Malurus leucopterus</i>	40
Grey Grasswren	<i>Amytornis barbatus</i>	193
Redthroat	<i>Pyrrholaemus brunneus</i>	1
Singing Honeyeater	<i>Lichenostomus virescens</i>	7
Black Honeyeater	<i>Certhionyx niger</i>	1
Orange Chat	<i>Epthianura aurifrons</i>	6
Red-capped Robin	<i>Petroica goodenovii</i>	8
Chirruping Wedgebill	<i>Psophodes cristatus</i>	11
Willie Wagtail	<i>Rhipidura leucophrys</i>	1
Black-faced Woodswallow	<i>Artamus cinereus</i>	1
Richard's Pipit	<i>Anthus novaeseelandiae</i>	1
Zebra Finch	<i>Taeniopygia guttata</i>	43
Mistletoebird	<i>Dicaeum hirundinaceum</i>	9

In early August 1994, at the height of an extended drought period (see Fig. 1), a pair of grasswrens with their two recently fledged chicks was observed and later captured. This pair occupied an isolated (though within the 11 ha study area) stand of Lignum of medium density that was 1–1.5 metres tall and approximately 0.5 hectares in area. The nest was 0.5 metres above the ground in the middle of a dense clump of Lignum approximately 3 metres in diameter. Over the three-day period of our presence at the study site no other Grasswrens were observed in this area. The family group of four birds was not observed to leave this patch of habitat despite regular disturbance, due to the project, over that period.

The record of successful breeding in August 1994 differed from earlier reports (Favaloro and McEvoy 1968; Robinson 1973; Cox 1976; Schodde 1982). The breeding territory of only 0.5 hectares was smaller than the earlier reports of 1–2 hectares. Also the breeding occurred during a severe drought when there had been no local surface water flow in the swamp for in excess of seven years, whereas earlier reports suggested that breeding occurred after surface water flow.

In normal climate years (see Fig. 1), birds were in relatively low numbers throughout the study area. In two, two-day visits in 1985 and 1988, 18 and 20 Grey Grasswrens respectively were captured. In the drought years of the early 1990s, the species appeared to be using the tall dense Lignum within the study area as a refuge. During a four-day visit in 1991, 47 individual Grey

Grasswrens were captured; 33 were trapped over three days in 1992; and over four days in 1994, 82 Grey Grasswrens were caught. The planned three-day trip in 1996 trip was abandoned after only four hours on the first day because of very windy conditions that seriously compromised mist netting. Only nine Grasswrens were captured, but based on the capture rate during the unfavourable trapping conditions, the prevailing drought and the results from previous visits during similar climatic conditions, such as in 1991 and 1992, it could be predicted that at least 40 grasswrens would have been caught if the visit to the site had lasted the planned three days.

The high capture rates in 1991, 1992, 1994 and the predicted captures in 1996 occurred during periods of declared drought in the region. The two visits to the site when the most grasswrens were captured (1991 and 1994) were also in years of below average rainfall when less than 150 millimetres was recorded in Tibooburra. The rainfall recorded in 1992 (243 mm) and 1996 (196 mm) was within the normal rainfall range.

During the drought years there was an obvious deterioration of the habitat as a consequence of grazing by rabbits and domestic beef cattle (*Bos* spp.). We concluded from these captures and observations that the species tends to congregate in large groups in remaining prime habitat during drought conditions. All of the visits to the study site when large numbers of birds were captured were in the period August to early October, so the congregations are not restricted to summer as has been suggested by Schodde (1982).

CONCLUSIONS

The perceived threats to the survival of the Grey Grasswren in the Bulloo were summarised by Garnett and Crowley (2000). Cattle grazing, particularly in dry years, was considered to be a threat to the habitat (McAllan and Cooper 1995). This study also noted damage by cattle to Lignum and Canegrass in dry years, but over the duration of the study, the main threat to the continued survival of the species in the study area appeared to be habitat destruction caused by rabbits eating the bark of the individual Lignum stems in dry years. This effectively ring-barked those stems and they died, resulting in a thinning of Lignum clumps. Numerous feral cats *Felis catus* were observed in the area but we did not observe any evidence to suggest grasswren predation by them. During the final brief visit to the site in April 2000, no grasswrens were located and for the first time, there was extensive rooting damage by feral pigs *Sus scrofa* throughout the study area.

During late 1999 and the first three months of 2000, heavy rain fell in the region of the study site. Additionally, flood waters from central Queensland filled the Caryapundy Swamp for the first time since 1989. During the final brief visit to the site in April 2000, no grasswrens were located and it was assumed that the birds had dispersed.

This study suggests that dense, tall Lignum serves as a refuge during periods of climatic extremes. Such habitat appears to contain sufficient food and shelter to serve as a refuge for a high density of Grey Grasswrens. Few birds of other species occupied the study site, but the number of grasswrens present during drought periods far exceeded the number of birds that might be expected during normal climatic years when the habitat would be partitioned into breeding territories. Preservation of similar habitat throughout the range of Grey Grasswrens is crucial and

therefore should be a high priority for the conservation of the species.

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CORRECTION TO SEPTEMBER 2002 ISSUE

Page 86 — V. W. Smith: Measurements of Birds at Goode Beach. Male Head-Bill Measurement should read: Male (HB > 43 mm).