



# **CARPENTARIAN GRASSWREN SURVEY**

**BOODJAMULLA  
(LAWN HILL)**

**NATIONAL PARK**

**15-30 JUNE 2011**



**Birds Australia**  
North Queensland Group  
*Birding with a Purpose*

**BIRDS AUSTRALIA  
NORTH QUEENSLAND**

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**Cover photo:** Brian Venables and Ceinwen Edwards at a Carpentarian Grasswren location, Boodjamulla National Park, June 2011 (photo Amanda Freeman).

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## 1.0 BACKGROUND

Carpentarian Grasswrens (*Amytornis dorotheae*) have been reported from four apparently discrete populations in Queensland and the Northern Territory – Borroloola, Wollogorang/China Wall/Hells Gate Roadhouse, Boodjamulla (Lawn Hill) National Park and Mount Isa/Gunpowder. They were not reported from the Mount Isa area until 1990 (Harris 1992) and from Boodjamulla until 1995 (Chapman 1996). The Borroloola population appears to be extinct (Perry *et al.* 2011 and failure by Birds Australia (North Queensland) survey in 2009). The Wollogorang population was confirmed by the BANQ survey in 2009 and at Moonlight Gorge (Perry *et al.* 2011) but appears to be severely reduced in area as the species has not been seen in the Hells Gate Roadhouse nor China Wall areas since 1986 (McKean & Martin 1989; Perry *et al.* 2011; J. Perry *pers. comm.*). The main threat to the species is thought to be the present fire regime with frequent, large fires often late in the dry season (Harrington *et al.* 2009, Murphy *et al.* 2011, Perry *et al.* 2011).

Prior to 2010 there were only six verified records of Carpentarian Grasswrens in the vicinity of Boodjamulla (Lawn Hill) National Park. There are four collections in the Queensland Museum by Wayne Longmore along the Murray's Springs Road and at 'The Amphitheatre' and two records by Peter Harris in 1995 are positioned as 25.5 km north of the Highland Springs homestead (Boles & Longmore 1998; Harris & Stewart 2009). There is also an unconfirmed report of the species in the hills near the entrance to the Park (J. Young *pers. comm.*).

A concerted attempt to find Carpentarian Grasswrens in Boodjamulla National Park was undertaken in 2008 (Harrington *et al.* 2009). Likely locations were selected using local knowledge, previous records and size of spinifex (*Triodia* spp.) but no birds were detected and it was feared that they had succumbed to widespread fire in 2006. However, the species was seen by H. Hines and E. Meyer (*pers. comm.*) along the Murray's Springs Road in October 2010 and by Boodjamulla National Park staff on the Duwadarri Plateau in January 2011 (L. Ezzy *pers. comm.*) (Table 1).

Of the three northern Carpentarian Grasswren localities, only Boodjamulla National Park is subject to active management for its natural biodiversity values. That Carpentarian Grasswrens still persist there makes it very important to find out where they are located and what environmental factors have contributed to the population's persistence in anticipation that informed fire management can help maintain the current population and perhaps result in the species extending its range.

In June 2011, Birds Australia (North Queensland) (BANQ) was contracted by the Queensland Parks and Wildlife Service (QPWS) to undertake a survey for Carpentarian Grasswrens in Boodjamulla National Park. The objectives of the survey were to;

- (1) assess where and why Carpentarian Grasswrens have persisted in some parts of Boodjamulla National Park and
- (2) consider the fire history of the Park, current fire practices and the survey results to inform future management of Carpentarian Grasswren habitat.

## 2.0 METHODS

We used two strategies to select sites to survey for Carpentarian Grasswrens. First we undertook to visit sites where Carpentarian Grasswrens have previously been recorded (Table 1) and revisit 2008 survey sites (Table 2) which, although no grasswrens were recorded in them, had been selected as potentially suitable habitat at the time of survey.

**Table 1: Records of Carpentarian Grasswrens in the vicinity of Boodjamulla National Park.**

Latitude	Longitude	Observer	Date	Reference (G. Harrington)	ID No. (2011)
18.70541	138.48132	L. Ezzy & co.	11/01/2011	<i>pers. comm.</i>	1
18.65361	138.38667	H. Hines	13/10/2010	<i>pers. comm.</i>	8
18.70667	138.48222	E. Meyer	11/10/2010	<i>pers. comm.</i>	1
18.60000	138.06667	N. Longmore	07/06/1995	X6/7	23
18.61528	137.98444	N. Longmore	06/06/1995	X6/6	Off park and burnt too recently.
18.59861	138.13444	N. Longmore	04/06/1995	"Amphitheatre" <sup>^</sup>	Actual point is unsuitable – a buffel grass river flat.
18.59861	138.05111	N. Longmore	02/06/1995	104	Burnt too recently.
18.41667	138.03333	P. Harris*	23/05/1991	H2	Burnt too recently.
18.40000	138.01667	P. Harris*	22/05/1991	H1	Burnt too recently.
"Near park entrance"		J. Young	unknown	<i>pers. comm.</i> to R. Forsyth	2&3

\*Incorrectly reported in Harris & Stewart (2009). These positions estimated from the description "25.5 km north of Highland Plains Homestead" (H1) and "2.5 km south east of former" (H2).

<sup>^</sup> This is not the correct location of the "Amphitheatre" (L. Ezzy *pers. comm.*). Access to the cultural site known as the Amphitheatre is restricted for cultural reasons.

**Table 2: Sites surveyed for Carpentarian Grasswrens by BANQ in 2008 with no positive results and reassessed in 2011.**

Latitude	Longitude	Survey No. (2008)	ID No. (2011)	Comments from 2011 survey
18.36833	138.04611	1380	-	No suitable spinifex seen from air (nearest point surveyed = ID 40).
18.34500	138.16083	1356	-	Area now off limits for cultural reasons.
18.39972	138.20389	1330	-	Grasswrens encountered 400 m from site.
18.43083	138.26861	1304	19	
18.42778	138.26639	1337	-	Surveyed within 1km (1304 = ID 19).
18.46889	138.11083	1320	-	No suitable spinifex seen from air (nearest point surveyed = ID 41).
18.58750	138.04583	1344	22	
18.66778	138.34111	1310	-	Area now off limits for cultural reasons so surveyed nearby (ID 13 & 14).
18.72083	138.48861	871, 307	4&5	
18.72083	138.49167	683		

We then selected further areas for survey that we considered, on the basis of their spinifex cover, topographic complexity and fire history, to be suitable Carpentarian Grasswren habitat. We allocated an identification number (ID No.) to each of these locations surveyed for Carpentarian Grasswrens from 15 to 30 June 2011 (Tables 1-4, Fig.1).

Topographic complexity, fire history and geological characteristics of each survey location were derived from:

***Topographic complexity:***

Given that certain landscape features affect fire behaviour (e.g. escarpments and gorges that impede the progress of fire) we calculated a score for topographical complexity at each survey location. To do this, we calculated the standard deviation of elevation values for a 4 x 4 sample area (= 1km<sup>2</sup>) of a 9" Digital Elevation Model (Geoscience Australia 2008). This generated a "topographic complexity score" on a scale of 0 to 69, with higher values being more complex.

**Fire history:**

A fire history from 2006 to 2010 (inclusive) was derived using Landsat 5TM satellite imagery. This imagery has a spatial resolution of 30m. Images were classified as either burnt or unburnt using a supervised classification based on user-identified training areas in ER Mapper 2011 (Erdas Inc., Norcross, GA, USA). Prescribed burns in 2011 as mapped by NAFI ([www.firenorth.org](http://www.firenorth.org); accessed 20 June 2011) were also included in the fire history. There were considerable difficulties with image availability and quality for 2006: two images captured the fire event that burnt extensive areas of Boodjamulla National Park, however both had some cloud cover in similar areas which precluded mapping.

**Geology:**

We used a 1:1 million scale geology dataset (Raymon & Retter 2010) to examine the broad geological characteristics of each site. The field "Lithgroup1" was used as the geological description.

We calculated the values for each of these variables at a point central to the survey track taken at each survey location (Table 4). All spatial manipulations and analyses were performed using ArcView 9.3.1 (Environmental System Research Institute Inc., Redlands, CA, USA).

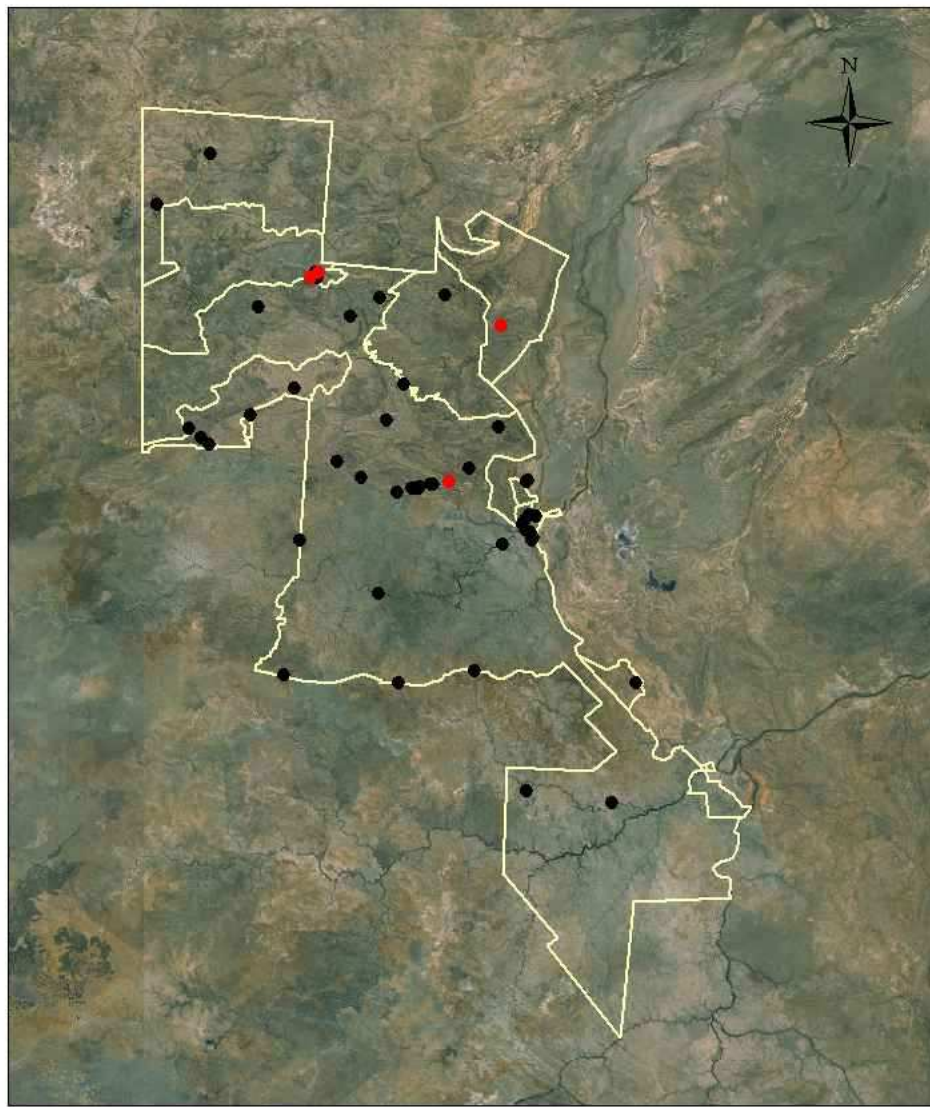
Surveys consisted of two to four observers (Brian Venables, Ceinwen Edwards, Steve Murphy and Amanda Freeman) walking through habitat on a route determined at the time by accessibility and presence of apparently suitable habitat. Call play-back was broadcast at frequent intervals of approximately 50m when in suitable habitat. Garmin GPS units (datum WGS 84) were used to determine the length of tracks traversed and the location of any Carpentarian Grasswrens observed. Surveys lasted from 20 mins to several hours (Table 3) depending on available time and our perceptions of the habitat. If a Carpentarian Grasswren was found, a survey sheet (Appendix 1) was completed and the site photographed (Appendix 2). Where grasswrens were encountered, we recorded site characteristics including:

- Percentage spinifex cover and mean height over a 20m transect due north from sighting position.
- Estimated percentage spinifex cover within 100m of sighting position.
- Estimated percentage boulder/cliff cover within 100m of sighting position.
- Significant topographic features and geological formations within 100m of sighting position.
- A broad description of the vegetation within 100m of sighting position.

**Table 3. Areas surveyed for Carpentarian Grasswrens and survey effort at Boodjamulla National Park, June 2011.**

ID	Survey Area	Central Position	Car/Foot <sup>1</sup> Helicopter <sup>2</sup>	Date	Time (24hr)	No. of playback points	Distance traversed (m)
1	Duwadarri Plateau	18.70483; 138.48323	1	15/6/2011	1030-1400	20+	3486
2	Northern side of park entrance gate	18.72556; 138.49350	1	15/6/2011	1610-1750	3	569
3	Southern side of park entrance gate	18.72900; 138.49300	1	15/6/2011	1650-1810	6	2729
4	Area near road into park	18.71900; 138.49100	1	16/6/2011	0743-1100	16	1902
5	North side of road into park	18.72100; 138.49100	1	16/6/2011	0810-1105	6	2263
6	Lawn Hill station, c8km from park's locked gate	18.65500; 138.48600	1	17/6/2011	1000-1100	2	376
7	Lawn Hill station, c8km from park's locked gate	18.65300; 138.48700	1	17/6/2011	1000-1100	5	1462
8	Doherty's Track, c6km E of Ridgepole WH turnoff	18.65400; 138.38700	1	17/6/2011	1425-1548	2	296
9	Doherty's Track	18.65800; 138.36700	1	17/6/2011	1615-1715	5	985
10	Doherty's Track	18.65900; 138.36300	1	17/6/2011	1620-1715	9	1466
11	Doherty's Track	18.66200; 138.34900	1	17/6/2011	1730-1800	3	331
12	Doherty's Track	18.66300; 138.34700	1	17/6/2011	1745-1830	2	396
13	Near Ridgepole WH, south side of vehicle track	18.66300; 138.34000	1	18/6/2011	0800-0900	5	788
14	Near Ridgepole WH, south side of vehicle track	18.66247; 138.34152	1	18/6/2011	1800-0910	4	567
15	Near junction of Amphitheatre & Stockyard Ck turnoff	18.38732; 138.22016	1	19/6/2011	0800-1215	25	3554
16	Near junction of Amphitheatre & Stockyard Ck turnoff	18.38739; 138.21696	1	18/6/2011	1630-1830	8	2096
17	Near junction of Amphitheatre & Stockyard Ck turnoff	18.39424; 138.21779	1	18/6/2011	1630-1830	10	2049
18	Near junction of Amphitheatre & Stockyard Ck turnoff	18.39481; 138.21065	1	19/6/2011	0800-1200	6	2702
19	Circa 37km NW of ranger base	18.44300; 138.26100	1	19/6/2011	1500-1700	13	4452
20	Circa 36km NW of ranger base	18.53500; 138.18900	1	20/6/2011	0900-0940	9	1606
21	North of Musselbrook base	18.57000; 138.13400	1	20/6/2011	1130-1240	3	1992
22	Vicinity of Murray's Springs	18.58600; 138.05600	1	20/6/2011	1540-1800	25	6569
23	South of vehicle track near Murray's Springs	18.59800; 138.07000	1	21/6/2011	0810-1010	21	4653
24	East of vehicle track to Murray's Springs	18.60700; 138.08100	1	21/6/2011	1050-1145	11	2364
25	East of road in limestone, road south from Musselbrook	18.73000; 138.19600	1	21/6/2011	1500-1715	12	1600

ID	Survey Area	Central Position	Car/Foot <sup>1</sup> Helicopter <sup>2</sup>	Date	Time (24hr)	No. of playback points	Distance traversed (m)
26	East of Musselbrook base	18.65000; 138.27400	1	22/6/2011	0800-0930	6	2000
27	Limestone area east of Musselbrook base	18.66900; 138.32100	1	22/6/2011	0950-1100	12	2026
28	Circa 11km NW of ranger base	18.63700; 138.41300	1	22/6/2011	1330-1435	23	1588
29	Southern access road, west of Riversleigh Rd	18.90200; 138.17600	1	24/6/2011	1200-1245	6	565
30	Southern access road, west of Riversleigh Rd	18.91200; 138.32200	1	24/6/2011	1510-1530	2	325
31	Southern access road, west of Riversleigh Rd	18.89600; 138.42000	1	24/6/2011	1600-1700	9	1900
32	Ranger base to Upper Gorge	18.71646; 138.48374	1	27/6/2011	0730-1415	12	7300
33	Constance Range	18.69892; 138.49675	1	28/6/2011	0835-1040	3	1500
34	Island Stack	18.69666; 138.48843	1	28/6/2011	1130-1300	14	1900
35	Stop 1 (12a)	18.58459; 138.45040	2	29/6/2011	0730-0810	8	783
36	Stop 2 (7a)	18.45507; 138.45278	2	29/6/2011	0830-0945	5	869
37	Stop 3 (6a)	18.41733; 138.38189	2	29/6/2011	1000-1040	5	660
38	Stop 4 (5a)	18.42033; 138.29781	2	29/6/2011	1100-1150	8	908
39	Stop 5 (2a)	18.23692; 138.08286	2	29/6/2011	1215-1300	7	635
40	Stop 6 (3b)	18.30163; 138.01420	2	29/6/2011	1415-1500	6	681
41	Stop 7 (4b)	18.43121; 138.14424	2	29/6/2011	1520-1610	6	1100
42	Stop 8 (9a)	18.53024; 138.32917	2	29/6/2011	1640-1725	5	840
43	Stop 1 (18a)	18.91190; 138.62521	2	30/6/2011	0730-0825	4	1200
44	Stop 2 (16a)	19.06502; 138.59526	2	30/6/2011	0845-0940	8	845
45	Stop 3 (17a)	19.04947; 138.48494	2	30/6/2011	1000-1035	4	824
46	Stop 4 (15a)	18.79819; 138.29760	2	30/6/2011	1100-1135	3	650
47	Stop 5 (13a)	18.73537; 138.45539	2	30/6/2011	1200-1240	5	565
48	Stop 6 (11a)	18.62907; 138.24364	2	30/6/2011	1330-1445	5	1100
49	Stop 7 (10b)	18.57684; 138.30664	2	30/6/2011	1500-1600	5	800
50	Stop 8 (Gorge)	18.71002; 138.47979	2	30/6/2011	1640-1755	7	946
	<b>TOTAL</b>				<b>74.5hrs</b>	<b>409</b>	<b>83.8km</b>



**Grasswren Survey Locations 2011**

- Grasswrens recorded
- Grasswrens not recorded

0 5 10 20 30 40 kilometers

**Figure 1. Location of Carpentarian Grasswren surveys in Boodjamulla National Park and Resource Reserve, June 2011.**

**Table 4. Areas surveyed for Carpentarian Grasswrens and their characteristics, Boodjamulla National Park, June 2011.**

ID	Survey Area	Geology	Fire History 2006 fire or 0=burnt prior to 2006	Topographic complexity score	Carpentarian Grasswrens	
					1=yes	0=no
1	Duwadarri Plateau	sedimentary siliciclastic	0	18		0
2	Northern side of park entrance gate	sedimentary siliciclastic	0	20		0
3	Southern side of park entrance gate	sedimentary siliciclastic	2006	20		0
4	Area near road into park	sedimentary carbonate	0	25		0
5	North side of road into park	sedimentary carbonate	0	25		0
6	Lawn Hill station, c8km from park's locked gate	sedimentary siliciclastic	0	10		0
7	Lawn Hill station, c8km from park's locked gate	sedimentary siliciclastic	0	10		0
8	Doherty's Track, c6km E of Ridgepole WH turnoff	sedimentary siliciclastic	0	7		1
9	Doherty's Track	sedimentary siliciclastic	2006	11		0
10	Doherty's Track	sedimentary siliciclastic	2006	11		0
11	Doherty's Track	sedimentary siliciclastic	2006	10		0
12	Doherty's Track	sedimentary siliciclastic	2006	10		0
13	Near Ridgepole WH, south side of vehicle track	sedimentary siliciclastic	0	11		0
14	Near Ridgepole WH, south side of vehicle track	sedimentary siliciclastic	0	11		0
15	Near junction of Amphitheatre & Stockyard Ck turnoff	sedimentary siliciclastic	0	33		1
16	Near junction of Amphitheatre & Stockyard Ck turnoff	sedimentary siliciclastic	0	33		0
17	Near junction of Amphitheatre & Stockyard Ck turnoff	sedimentary siliciclastic	0	22		0
18	Near junction of Amphitheatre & Stockyard Ck turnoff	sedimentary siliciclastic	0	14		1
19	Circa 37km NW of ranger base	sedimentary siliciclastic	0	19		0
20	Circa 36km NW of ranger base	sedimentary siliciclastic	0	4		0
21	North of Musselbrook base	regolith	0	2		0
22	Vicinity of Murray's Springs	sedimentary siliciclastic	0	15		0
23	South of vehicle track near Murray's Springs	sedimentary siliciclastic	0	7		0
24	East of vehicle track to Murray's Springs	sedimentary siliciclastic	0	7		0
25	East of road in limestone, road south from Musselbrook	sedimentary carbonate	2006	12		0

ID	Survey Area	Geology	Fire History 2006 fire or 0=burnt prior to 2006	Topographic complexity score	Carpentarian Grasswrens	
					1=yes	0=no
26	East of Musselbrook base	igneous mafic volcanic	2006	11		0
27	Limestone area east of Musselbrook base	sedimentary carbonate	0	10		0
28	Circa 11km NW of ranger base	sedimentary siliciclastic	2006	22		0
29	Southern access road, west of Riversleigh Rd	sedimentary carbonate	2006	3		0
30	Southern access road, west of Riversleigh Rd	sedimentary carbonate	2006	3		0
31	Southern access road, west of Riversleigh Rd	sedimentary carbonate	2006	4		0
32	Ranger base to Upper Gorge	sedimentary carbonate	0	15		0
33	Constance Range	sedimentary siliciclastic	0	35		0
34	Island Stack	sedimentary siliciclastic	0	28		0
35	Stop 1 (12a)	sedimentary siliciclastic	0	48		0
36	Stop 2 (7a)	sedimentary siliciclastic	2006	27		1
37	Stop 3 (6a)	sedimentary siliciclastic	0	18		0
38	Stop 4 (5a)	sedimentary siliciclastic	0	37		0
39	Stop 5 (2a)	sedimentary siliciclastic	0	16		0
40	Stop 6 (3b)	sedimentary siliciclastic	0	24		0
41	Stop 7 (4b)	sedimentary siliciclastic	0	14		0
42	Stop 8 (9a)	sedimentary siliciclastic	0	12		0
43	Stop 1 (18a)	sedimentary carbonate	2010	14		0
44	Stop 2 (16a)	sedimentary carbonate	2006	14		0
45	Stop 3 (17a)	sedimentary carbonate	2006	15		0
46	Stop 4 (15a)	sedimentary carbonate	2006	9		0
47	Stop 5 (13a)	sedimentary carbonate	0	14		0
48	Stop 6 (11a)	sedimentary siliciclastic	0	22		0
49	Stop 7 (10b)	sedimentary siliciclastic	0	14		0
50	Stop 8 (Gorge)	sedimentary siliciclastic	2006	16		0

### 3.0 OUTCOMES

We spent 74.5 hours, walking nearly 84km, mostly through apparently suitable habitat, searching for Carpentarian Grasswrens. We used call playback over 400 times (Table 3).

Five groups of Carpentarian Grasswrens were located in four survey areas (Fig. 1, Table 5); one where they had been recorded in October 2010 (ID 8) and in three new locations.

All sightings were in areas with sedimentary siliciclastic (sandstone) lithology (Table 4) where 75-100% of the vegetation within 1km had not burnt for at least 5 years (Table 6, Fig 2.). Each site had features providing refuge from fire such as rocky ridges, outcrops or low cliffs (Table5 ) and this was reflected in the extensive cover (mean = 45%; range 35-65%) of relatively tall (mean = 60cm) spinifex.

Many areas surveyed, where we did not locate Carpentarian Grasswrens, had similar characteristics to those in which we found the birds (Table 4) and appeared, on inspection, to be suitable habitat.

**Table 6. Area of spinifex age classes within 1km of Carpentarian Grasswren sightings.**

Sighting ID	6+ years since fire	5 years since fire	2 years since fire	1 year since fire
1	145 ha (46%)	90 ha (29%)	79 ha (25%)	-
2	70 ha (22%)	245 ha (78%)	-	-
3	93 ha (29%)	222 ha (71%)	-	-
4	67 ha (21%)	247 ha (79%)	-	-
5	64 ha (20%)	248 ha (79%)	-	2 ha (1%)

**Table 5. Locations where Carpentarian Grasswrens were recorded and their specific site characteristics, Boodjamulla National Park, June 2011.**

Survey ID	Sighting ID	Location	Date	No. of birds	Playback response* Yes/No	% Spinifex cover (transect)	Mean spinifex height (transect) (cm)	% Spinifex cover (within 100m)	% Boulder/ cliff cover (within 100m)	Significant Topography/ Geological Formations (within 100m)	Vegetation (within 100m)
8	1	18.65348 138.38510	17 June 2011	3	First heard from road, later responded to playback.	88	68	40	20	Low rocky ironstone ridge line/boulders as low cliff (2m high).	Old unburnt spinifex, moderately dense shrub layer and low eucalypts on ridge.
15	2	18.38315 138.22180	19 June 2011	2	Yes	73	63	65	90	4m high sandstone outcrop situated mid-slope.	Long unburnt spinifex, floristically and structurally diverse shrub layer/mid-storey.
18	3	18.39518 138.21127	19 June 2011	1	First heard c.20mins after playback.	62	53	45	10	Low sandstone cliff (2m high) running below ridge.	Spinifex younger (5yrs) though older spinifex within 300m, moderate cover of eucalypts, grevilleas and spindly acacia.
18	4	18.39691 138.20625	19 June 2011	2	No – alerted to birds' presence by call.	60	65	35	1	On saddle between two sandstone ridges (just beyond 100m).	Big clumps of thick tall spinifex with acacia, moderate cover of small eucalypts and shrubs.
36	5	18.45446 138.45134	29 June 2011	2	Yes	50	51	40	5	Gully with low rocky sandstone wall part way across entrance, numerous low rocky outcrops especially up gullies.	Mostly older spinifex, moderate cover of eucalypts, scattered mid-storey trees, sparse shrubs, other grasses.

\* How Carpentarian Grasswrens were first found.

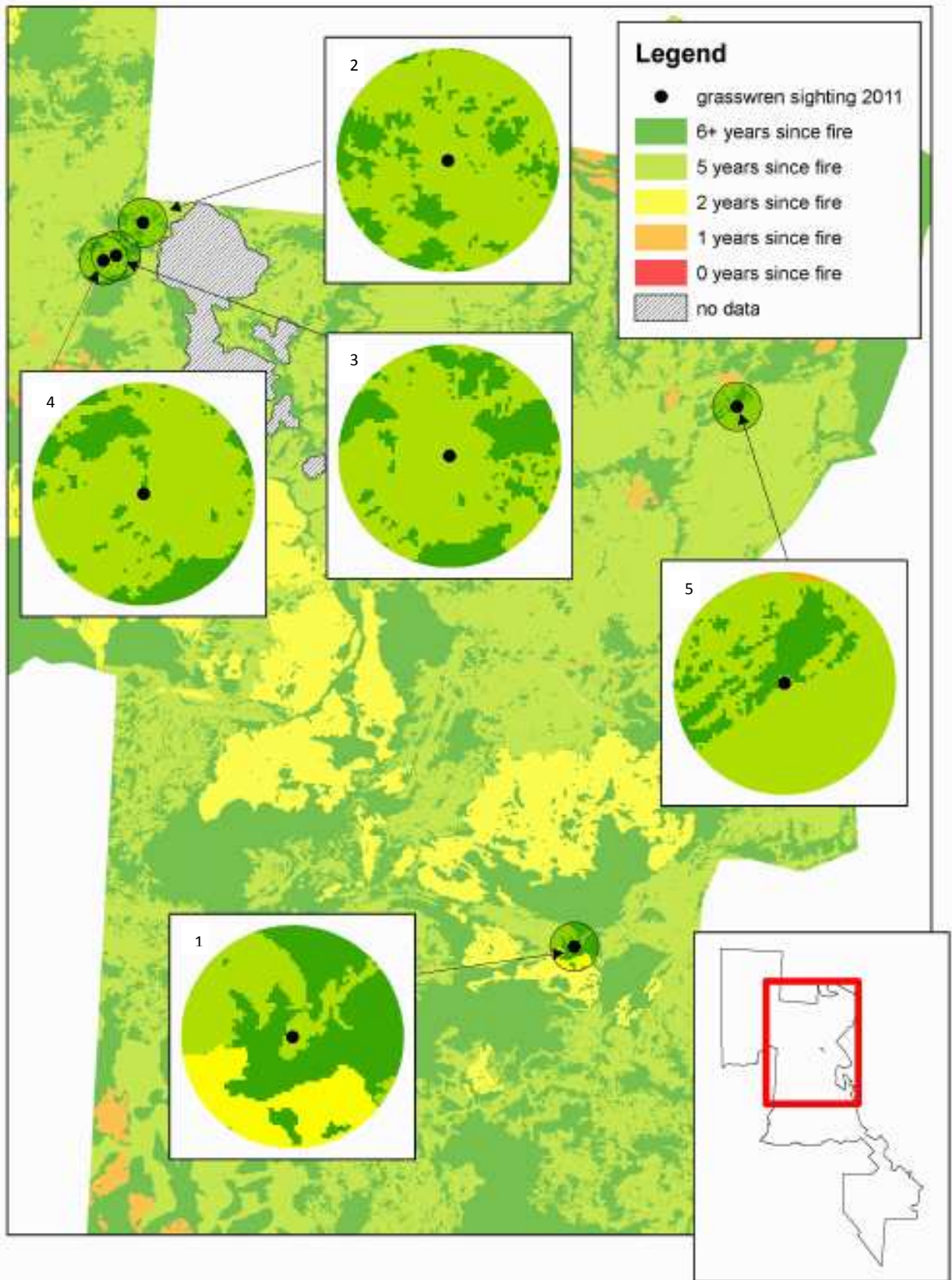


Figure 2. Age of spinifex (time since burning) within 1km radius of Carpentarian Grasswren sightings in Boodjamulla National Park.

## 4.0 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 STATUS

With more than 70 hours spent searching over 80km of mostly apparently suitable habitat we located only five groups of Carpentarian Grasswrens. Although this species is known to be cryptic and difficult to detect, it seems, given the search effort, that Carpentarian Grasswrens are now highly restricted and in small numbers in Boodjamulla National Park. Our failure to detect grasswrens in areas where they were found in 1991 and 1995 also suggests that the species' former range has contracted in the Park. We did, however, confirm the continued presence of grasswrens in the area where they were seen in October 2010 and in three additional locations. These locations are widely spaced, at 20-30km apart, with extensive areas of potentially suitable habitat between them into which Carpentarian Grasswrens could disperse, bolstering the population, given enough time without widespread fire.

### 4.2 MANAGEMENT

The locations in which we found Carpentarian Grasswrens concur with the conclusion that northern populations of the species are restricted to dissected, topographically complex, sandstone and conglomerate hills and plateaux (Perry *et al.* 2011). The cliffs, gorges and rocks in these areas naturally afford some protection from, and are less susceptible to, fire allowing mature spinifex, on which Carpentarian Grasswrens depend for food, shelter, nesting and protection against predators, to remain unburnt.

There were many areas surveyed that appeared to have suitable habitat but in which Carpentarian Grasswrens were not detected. Their absence from these areas may be explained by their long-term fire history and proximity to fire refuges, however but we are unable to assess this with the mapping we have done at this point, which only extends back to 2006.

Protecting and enhancing mature spinifex in fire refuges will be critical to maintaining, and perhaps expanding, populations of Carpentarian Grasswrens in Boodjamulla National Park. It can also be expected to benefit other fire-sensitive species such as the Gouldian Finch (*Erythrura gouldiae*), Spinifexbird (*Eremiornis carteri*) and some small territorial mammals (eg Carpentarian False Antechinus *Pseudantechinus mimulus* recorded during this survey).

Landscape scale fire management is required to reduce the risk of intense and extensive fire that can damage fire refuges, eliminating mature spinifex. This objective is reflected in current fire management at Boodjamulla which aims to use prescribed burning in such a way that unburnt patches remain that have a high chance of escaping uncontrolled wildfire. In this way, over time, the extent and distribution of long-unburnt habitat should increase.

To maximise the benefits to Carpentarian Grasswrens, the annual fire programme needs to be modified. Aside from burning carried out for boundary protection and specific needs such as

mustering, current fire plans are based on what has and has not burnt in the last few years and aims to achieve an approximately five to seven year rotation. Within that broad strategy, fire management attempts to be random with a flight path randomly allocated and incendiaries deployed ad hoc in an attempt to create a mosaic of different age spinifex (G. Featonby pers. comm.). Therefore large areas of long-unburnt spinifex are neither targeted nor avoided. In contrast, we recommend that known Carpentarian Grasswren sites and a range of other areas with innate protection be protected from intentional fire.

## 4.3 RECOMMENDATIONS

### General Points:

***The management of CGWs in Boodjamulla NP should focus first on identifying and protecting existing occupied grasswren habitat from fire. The birds occupying these areas are presumably relics of a once continuous population. Then fire management should aim to establish the right conditions for the re-establishment of territories in habitat adjacent to the existing relic subpopulations (see below).***

Historically, it is probable that CGWs moved in response to changing habitat suitability, which was (and still is) driven by fire. When occupied habitat was burned, birds moved into nearby previous firescars which, by that stage, had matured sufficiently to support them. Another source of CGWs to colonise old firescars would be sub-adults leaving the breeding territory of their parents. Thus we have a scenario of a dynamic mosaic of patches of spinifex of different fire-age mirrored by a dynamic population of CGWs.

The contemporary fire pattern appears to be maintaining large areas as homogenous early successional age classes that are not suitable for CGWs, hence the decline and fragmentation of CGWs at Boodjamulla.

The existing fragmented subpopulations seem to be located in long term fire refuges, which rarely burn due to natural protection. However, this is not to say that these areas are totally immune to fire.

The recovery of CGWs in Boodjamulla will rely on these relic subpopulations acting as a source of subadults, which will disperse into nearby, suitably large areas of 5+ year old spinifex.

### Specific objectives & recommendations

1. ***On-going surveys to identify additional relic subpopulations.*** These surveys should be based on a deep (20+ year) Landsat-based fire history. High priority areas to search are those that have always had significant unburnt patches in the vicinity, despite widespread fires. We have examined the availability of Landsat imagery for Boodjamulla NP and comprehensive cloud free imagery extends back to 1988 (23 years). The imagery between 1993 and 1999 is only available through Geoscience Australia at a cost of approx. \$12,000

in imagery cost alone (allowing 3 images per year). The remainder is available through US Geological Survey at no cost.

- 2. *Revisit known Carpenterian Grasswren locations biannually to check for their continued presence.*** As confidence grows in the persistence of grasswrens in unburnt habitat the time frame can be relaxed. See also Recommendation 4(e).
- 3. *Plan prescribed burning to avoid and protect any area with known or suspected presence of grasswrens..***
- 4. *In order to encourage sub-adult grasswrens to populate areas adjacent to the relic areas, we recommend the following procedure as a trial.*** Create multiple discrete patches of unburnt spinifex within 20km (approx.) of the relic area. Over time, the unburnt patches will mature for dispersing subadults to establish territories. This might be best achieved by intensive on-ground burning, rather than aerial operations.
- 5. *Several key fire metrics should be generated annually to be used as the basis for planning burning management, and assessment of and reporting on the impact on CGWs (and other biota of interest):***
  - a. Record the location and distance of aerial incendiary runs using GPS and GIS.
  - b. Map prescribed fire scars using remote sensing and GIS (Landsat-based).
  - c. Calculate the number, extent and age of discrete unburnt spinifex patches created by prescribed burning within 20 km of known relic subpopulations (using GIS).
  - d. Map unplanned wildfires using remote sensing and GIS (Landsat-based).
  - e. Register instances of known relic subpopulations being burnt by fire and conduct surveys as soon as practicable in adjacent unburnt habitat to detect CGWs.

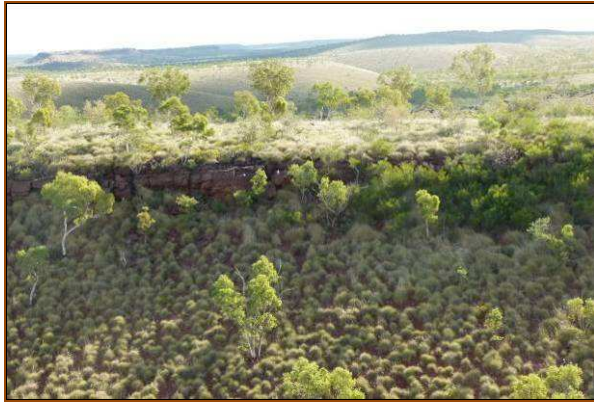
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**APPENDIX 2: PHOTOGRAPHS OF CARPENTARIAN GRASSWREN SITES**

**Site 1: 18.65348; 138.38510**



*View of site from helicopter, 29 June 2011*



*View west of road, 17 June 2011*



*View North from site, 17 June 2011*



*View West from site, 17 June 2011*



*View South from site, 17 June 2011*



*View East from site, 17 June 2011*

**Site 2: 18.38315; 138.22180**



*View from site, 19 June 2011*

**Site 3: 18.39518; 138.21127**



*View North from site, 19 June 2011*



*View West from site, 19 June 2011*



*View South from site, 19 June 2011*



*View East from site, 19 June 2011*

**Site 4: 18.39691; 138.20625**



***View North from site, 19 June 2011***



***View West from site, 19 June 2011***



***View South from site, 19 June 2011***



***View East from site, 9 June 2011***

**Site 5: 18.45446; 138.45134**



*Looking towards site in gully*



*View of site (top right) from helicopter*



*View North from site, 29 June 2011*



*View West from site, 29 June 2011*



*View South from site, 29 June 2011*



*View East from site, 29 June 2011*

### **APPENDIX 3: EXCEL DATABASE OF BIRD RECORDS**

Excel database (*Boodjamulla CGW survey – All species bird records*) of bird records compiled during surveys. Bird survey data will be submitted to The Atlas of Australian Birds.