Two new but threatened subspecies of Rufous Grasswren Amytornis whitei (Maluridae)

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Source: Bulletin of the British Ornithologists' Club, 140(2) : 151-163

Published By: British Ornithologists' Club

URL: https://doi.org/10.25226/bboc.v140i2.2020.a6

Two new but threatened subspecies of Rufous Grasswren *Amytornis whitei* (Maluridae)

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Received 27 March 2020; revised 3 May 2020; published 22 June 2020

http://zoobank.org/urn:lsid:zoobank.org:pub:7305657F-C558-4178-82B3-09B0BF208D0D

Summary.—Rufous Grasswren *Amytornis whitei* is the most widely distributed of three species formerly included within the Striated Grasswren *A. striatus* complex. Included among four phenotypically, geographically and ecologically distinct populations are *A. w. whitei* of the Pilbara ironstone ranges of Western Australia and *A. w. oweni* of inland sandy deserts. The other two are the little-known small-billed isolate of the limestone plateau of the Cape Range, North West Cape Peninsula, Western Australia, and a larger form present in the mallee of the Eyre Peninsula, South Australia. We present morphometric and other data and describe these two populations as new subspecies; both are of conservation concern.

Until recently, 11 species of Australian grasswrens (genus *Amytornis*) were recognised (Black *et al*. 2010, Garnett *et al*. 2011, Black & Gower 2017, Gill & Donsker 2019, BirdLife Australia 2019, BirdLife International 2019). The most widely distributed, albeit with a broken distribution, was known as Striated Grasswren *A. striatus* (Gould, 1840) but its infraspecific taxonomy and taxonomic ranking were unsettled (Schodde & Mason 1999, Christidis *et al*. 2010, 2013, Black & Gower 2017, Black *et al*. 2019). In a phylogenetic and phenotypic analysis of the Striated Grasswren complex, Black *et al*. (in press) assessed plumage and morphometry of 161 specimens from across its range and sequenced mitochondrial DNA (ND2) from most populations. From the mtDNA data, two clades were recovered, separated across the Eyrean Barrier, a Plio-Pleistocene agency of vicariance in southern Australian birds (Ford 1974, 1987a, Schodde & Mason 1999, Dolman & Joseph 2015). An eastern clade comprised two highly divergent subclades of south-eastern Australian and central Queensland populations, respectively. The western clade included all other sampled populations. Nucleotide divergences between each of the three clades of between 3.01 ± 0.87% and 4.56 ± 1.39% are levels typical of species-rank distinction in birds (Avise & Walker 1998, Joseph & Omland 2009, Hung *et al*. 2016, Joseph 2018). Accordingly, and with statistically validated phenotypic correlation among larger groups, three species and seven distinct populations were identified within the complex, thus:

1. Striated Grasswren *A. striatus sensu stricto* (south-eastern subclade) in south-eastern Australian mallee (a semi-arid low woodland of multi-stemmed *Eucalyptus* spp. trees, themselves also called mallees), with allopatric subspecies *A. s. striatus* in central New South Wales and *A. s. howei* (Mathews, 1911) in the Murray Mallee region of Victoria, South Australia and south-west New South Wales;
2. Opalton Grasswren *A. rowleyi* Schodde & Mason, 1999 (north-eastern subclade) in central Queensland, in a varied open woodland on lateritic gravel; and
3. Rufous Grasswren *A. whitei* Mathews, 1910 (western clade) in the west of the continent, comprising four distinct phenotypes. Two were recognised as subspecies, nominate *A. w. whitei* of the Pilbara ironstone ranges of Western Australia, and *A. w. oweni* Mathews, 1911 of central and western sandy deserts, including the Great Victoria Desert (Fig. 1).

ISSN-2513-9894 (Online)

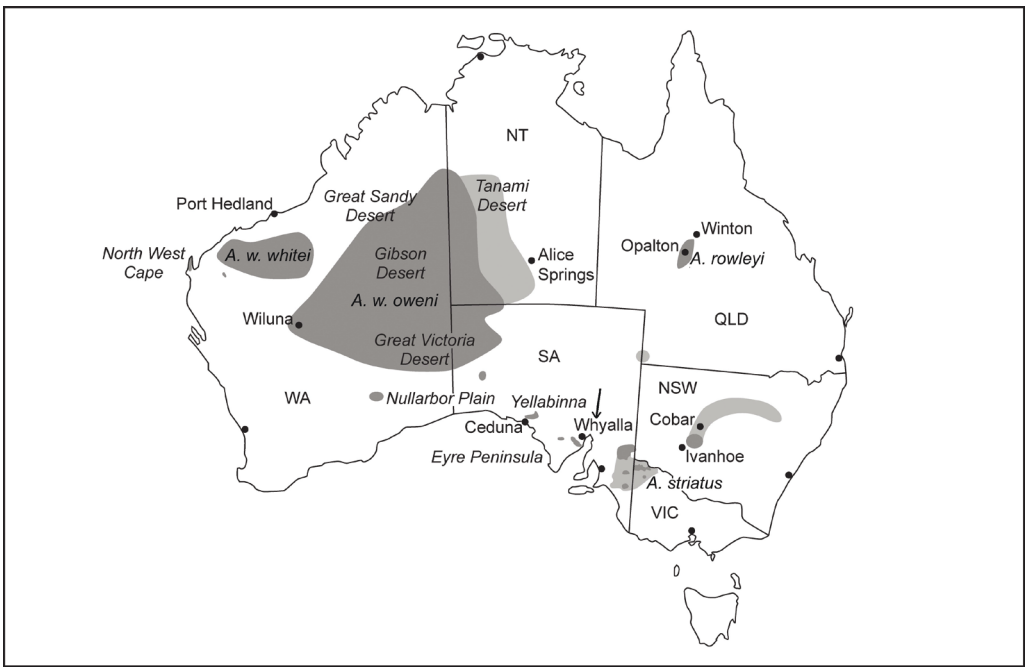

Figure 1. Distribution of the Striated Grasswren *Amytornis striatus*–Rufous Grasswren *A. whitei* complex; from west to east, North West Cape Peninsula, the Pilbara (*A. w. whitei*), western, central and southern deserts (*A. w. oweni*), western (Yellabinna) and eastern Eyre Peninsula and, east of the Eyrean Barrier (arrow at Spencer Gulf, South Australia), central Queensland (*A. rowleyi*) and the south-eastern mallee of South Australia, Victoria and New South Wales (*A. striatus*). Pale shading indicates former distribution (B. Cale, modified by B. Blaylock)

Two additional phenotypes were identified within Rufous Grasswren from populations of the Cape Range, North West Cape Peninsula, Western Australia, and the Eyre Peninsula, South Australia respectively. The last comprises two disjunct subpopulations, in the southern Yellabinna, a south-eastern extension of the Great Victoria Desert, and in the eastern Eyre Peninsula. We count geographically partitioned intraspecific differentiation as a measure of biodiversity best identified through the naming of subspecies (Patten 2015, Patten & Remsen 2017) and here describe the Cape Range and Eyre Peninsula populations accordingly.

Methods

One of us (ABB) examined all adult specimens of *A. whitei* in the following institutions: Western Australian Museum, Perth; South Australian Museum, Adelaide; Australian National Wildlife Collection, Canberra; Museum Victoria, Melbourne; and American Museum of Natural History, New York: 13 male and 12 female *A. w. whitei*, 37 male and 22 female *A. w. oweni*, eight male and five female Eyre Peninsula, South Australia specimens, and the only adult male and adult female specimens from the Cape Range, Western Australia. Specimens were collected between 1894 and 2007; 40 before 1965, 42 between 1965 and 1984, and 17 since 1997.

The underlying plumage tone of crown, upperparts and underparts was assessed using selected individual colours in Smithe (1975) suitable for comparison among populations of the species complex, also the nature of the dorsal streaking, the breadth of the white shaft-streaks, the breadth and tone of their dark edges, and the colour of the bill, legs and feet.

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Standard measurements were taken as follows: bill length from skull attachment to tip, bill depth at the point of the frontal feathering, wing length (max. flattened chord) and tail length (central rectrix from point of emergence to tip).

As described by Black *et al*. (in press) (R Core Team 2018), all morphometric data were compared using type-II two-way ANOVA. Subsequent post-hoc analyses were conducted using pairwise comparison of least-square means and Welch two-sample t-tests. Principal component analysis (PCA) of morphometric data was calculated and a PCA biplot drawn, using the 'factoextra' package for R. Sample means, standard deviations, standard errors of the mean and 95% confidence intervals for the mean were calculated for all parameters in each sex and all groups. Two-way ANOVA showed the significant effects of group assignments and of sex. Post-hoc least-square comparison of the ANOVA model showed where groups differed with respect to individual parameters in each sex at 95% confidence. Welch two-sample t-tests were applied to those metrics shown to differ between groups by the post-hoc analysis.

Results

Plumage.—Dorsal tone varies individually within all populations of *A. whitei* but ranges from the darkest and dullest in Eyre Peninsula populations through brighter (more saturated) tones of *A. w. oweni* to the darkest rufous in *A. w. whitei* and palest

Figure 2. Dorsal view of specimens of the Striated Grasswren *Amytornis striatus*–Rufous Grasswren *A. whitei* complex; from left: *A. w. whitei* male, SAMA B646, Fortescue River, Western Australia, 9 February 1915; *A. w. oweni* female, SAMA B37659, 165 km north of Cook, South Australia, 31 August 1983; *A. whitei* (Yellabinna) male, ANWC 52262, 96 km north of Ceduna, South Australia, 12 August 2007; *A. whitei* (Yellabinna) male, SAMA B37658, 50 km north of Ceduna, South Australia, 21 August 1983; *A. whitei* (eastern Eyre Peninsula) female, SAMA B55486 Secret Rocks, South Australia, 3 September 2000; *A. s. howei* male, SAMA B55502, Gluepot Reserve, South Australia, 8 November 2006; *A. s. striatus* female, ANWC 31651, Yathong Nature Reserve, New South Wales, 31 August 1999; *A. rowleyi* female, ANWC 48514, 80 km south-southwest of Winton, Queensland, 26 September 1996; note the comparative size of *A. w. whitei and A. w. oweni*, and the variation in plumage tone between Yellabinna specimens (P. Horton)

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Figure 3. Ventral view of the same specimens in the same order, as in Fig. 2. Note the more evenly distributed cinnamon underparts of *A. w. whitei* (P. Horton)

cinnamon-rufous in *A. w. oweni*. Generally, Eyre Peninsula specimens are predominantly rufous-russet to rufous, although two western (Yellabinna) specimens more closely resembled *A. w. oweni* and *A. w. whitei* in tone, being rufous to cinnamon-rufous. White dorsal feather streaking is narrower in *A. w. oweni* and less distinctly edged paler brown in both *A. w. oweni* and *A. w. whitei* (Fig. 2). Underparts also vary in all populations, generally pale buff or off-white, darker towards the flanks. In *A. w. whitei* and some *A. w. oweni* the tone is more evenly distributed on the underparts and is closer to cinnamon (Fig. 3). Bare parts are dark in Eyre Peninsula specimens, generally paler in *A. w. oweni* and *A. w. whitei*.

Morphometrics.—The results of all measurements are summarised in Table 1. Analysis of variance (ANOVA) for each parameter revealed discrete morphometric clusters. PCA provided separation of *A. w. whitei* from both *A. w. oweni* and Eyre Peninsula birds on bill dimensions, and the latter two on wing and tail lengths (Fig. 4). A t-test pairwise comparison of parameters identified by ANOVA as distinct revealed statistically significant differences among samples of *A. w. whitei*, *A. w. oweni* and Eyre Peninsula (Table 1).

The bills of *A. w. whitei* are both longer and deeper than in other populations and their wings and the wings of birds on the Eyre Peninsula are longer than those of *A. w. oweni*. The bill of birds on the Eyre Peninsula is relatively long and slender compared to *A. w. oweni* whose bills are statistically deeper, and their tails are longer than those of *A. w. oweni* in males (Table 1, Fig. 4).

The two small Cape Range specimens have shorter bills than any specimen of *A. w. whitei*. Most measurements fall within the range for *A. w. oweni*, but their wings are longer than all but two of 37 male specimens and one of 22 females of *A. w. oweni* (Table 1).

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TABLE 1
Morphometrics (mm) of populations within Rufous Grasswren *A. whitei*, showing (except for Cape Range) sample number, mean and standard deviation for each parameter. Superscripts indicate metrics that show differences among Eyre Peninsula, Cape Range, and named populations.

MALES

Population	Wing	Tail	Bill length	Bill depth
A. w. whitei (*n* = 13)	61.5 ± 2.1 [1]	85.4 ± 4.1	13.8 ± 1.0 [3 5]	5.1 ± 0.3 [3]
A. w. oweni (*n* = 37)	56.4 ± 2.2 [1 4]	84.2 ± 5.0 [2]	12.1 ± 0.7 [3]	4.7 ± 0.3 [3]
Eyre Peninsula (*n* = 8)	61.6 ± 2.6 [1]	88.1 ± 3.4 [2]	12.5 ± 0.4 [3]	4.5 ± 0.2 [3]
Cape Range (*n* = 1)	60 [4]	82.7	12.1 [5]	

[1] Wings of *A. w. whitei* > *A. w. oweni* $p < 0.0001$, Eyre Peninsula > *A. w. oweni*, $p = 0.00047$.
[2] Tails of Eyre Peninsula > *A. w. oweni*, $p = 0.018$.
[3] Bill length and depth of *A. w. whitei* > Eyre Peninsula, *A. w. oweni* $p < 0.0001$, bill depth of *A. w. oweni* > Eyre Peninsula, $p = 0.036$.
[4] Wing of Cape Range ≥ *A. w. oweni*.
[5] Bill length of Cape Range << *A. w. whitei*.

FEMALES

Population	Wing	Tail	Bill length	Bill depth
A. w. whitei (*n* = 12)	57.9 ± 2.1 [1]	82.1 ± 4.2	13.7 ± 0.8 [2 4]	5.1 ± 0.3 [2]
A. w. oweni (*n* = 22)	55.0 ± 1.4 [1 3]	82.5 ± 4.8	11.9 ± 0.5 [2]	4.6 ± 0.3 [2]
Eyre Peninsula (*n* = 5)	59.0 ± 2.6 [1]	80.5 ± 3.2	12.2 ± 0.3 [2]	4.3 ± 0.1 [2]
Cape Range (*n* = 1)	57 [3]	82.1	12.1 [4]	

[1] Wings of *A. w. whitei* > *A. w. oweni* $p = 0.00051$, Eyre Peninsula > *A. w. oweni*, $p = 0.023$.
[2] Bill length and depth of *A. w. whitei* > Eyre Peninsula, length of *A. w. whitei* > *A. w. oweni* $p < 0.0001$, depth of *A. w. whitei* > *A. w. oweni* $p = 0.00093$, depth of *A. w. oweni* > Eyre Peninsula, $p = 0.0036$.
[3] Wing of Cape Range ≥ *A. w. oweni*.
[4] Bill length of Cape Range << *A. w. whitei*.

Discussion

In the mtDNA data of Black *et al*. (in press) *A. w. oweni* and Yellabinna samples were genetically close in a polytomy with *A. w. whitei*, but Cape Range and eastern Eyre Peninsula populations were not sequenced. More extensive sampling is therefore needed to clarify phylogenetic relationships within the species.

Plumages are similar across all populations of *A. whitei* and vary within groups, so are relatively uninformative. Grasswren plumage tone is not known to change throughout the annual cycle and variation was not found to correlate with season of collection or specimen age. Eyre Peninsula populations are mostly darker and more distinctly streaked but two western (Yellabinna) specimens approach the brighter tones of *A. w. oweni*. The underparts of *A. w. whitei* are more extensively and evenly cinnamon-coloured. Upperparts streaking is narrower in *A. w. oweni*.

While neither plumage diversity nor available genetic data identify clear subspecific boundaries within *A. whitei*, four morphometrically distinct phenotypes occur (Black *et al*. in press; this study). *A. w. whitei* has longer wings than *A. w. oweni* and its bill is larger than all others. Eyre Peninsula specimens have longer wings than *A. w. oweni*, in both sexes and longer tails in males, but relatively finer bills. While the two Eyre Peninsula populations, separated by more than 250 km, are provisionally placed in the same taxon, it is plausible

ISSN-2513-9894 (Online)

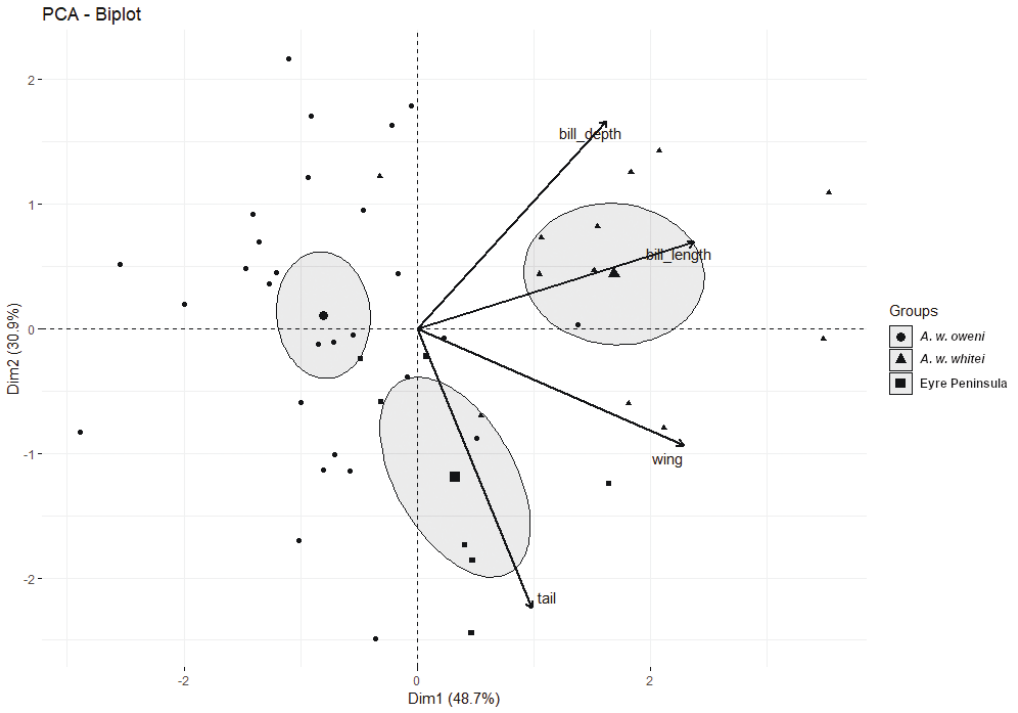

Figure 4. Principal Component Analysis of the morphometrics, showing standard 95% confidence ellipses of centroids for males of three populations, *A. w. whitei*, *A. w. oweni* and the Eyre Peninsula.

that DNA sequencing of eastern Eyre Peninsula samples might expose further diversity. The Cape Range population has been included implicitly (Higgins *et al*. 2001) or explicitly (Johnstone & Storr 2004, Johnstone *et al*. 2013) in *A. striatus whitei*, now *A. whitei*, both occupying stony uplands and distinct ecologically from *A. w. oweni* of sandy deserts. The two specimens are smaller than Pilbara *A. w. whitei* but have wings and tails of similar length yet much smaller bills (Figs. 5–6). The Cape Range is an area of endemism for fauna, including birds (Ford 1987b, Kendrick 1989, Frith & Frith 1997, Chakrabarty 2010, Taylor *et al*. 2015, Doughty *et al*. 2016).

Two new subspecies of Rufous Grasswren Amytornis whitei

Cape Range Rufous Grasswren

Hartert (1905: 226) commented in relation to a grasswren specimen collected near Marble Bar in the northern Pilbara by J. T. Tunney on 5 May 1901 that it 'closely resembles specimens called *A. striatus* and collected near Point Cloates [North West Cape Peninsula], Western Australia by Mr Tom Carter, but the bill is very much larger, measuring 15 mm? The dimensions also are generally a little larger but not much. It would be interesting to know if such size differences exist in this species, or whether there are different races.'

The Cape Range grasswrens collected by Carter were, as above, accepted simply as examples of *A. striatus* (Carter 1903, North 1901–04) but the population is presently included in the Pilbara taxon *A. s. whitei* (Johnstone & Storr 2004, Johnstone *et al*. 2013).

When Tunney's specimen (AMNH 598127) and Carter's (AMNH 598125 male, AMNH 59126 female) were examined together on 10 April 2013, the size difference was obvious (Fig. 5), and an earlier observer had written 'oweni?' (the smaller desert form) on a label

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Figure 5. Ventral view of specimens of Rufous Grasswren *A. whitei*, from left: *A. w. oweni* male, AMNH 598115, Bore Well, Western Australia, 5 August 1909; *A whitei* (Cape Range) male, AMNH 598125, 21 May 1900; *A. whitei* (Cape Range) female, AMNH 598126, 21 May 1900; *A. w. whitei* female, AMNH 598127, Marble Bar, Western Australia, 5 May 1901; note the small and barely streaked Cape Range specimens (B. Bird)

of the female. Measurements did not reveal a marked disparity in wing and tail lengths but confirmed Hartert's remark concerning the striking difference in bill size, 15.8 mm in Tunney's specimen, vs. 12.1 mm in the others (Fig. 6). The above Cape Range specimens are the only two adult skins known from this population and are here described as holotype and paratype of a new subspecies.

Amytornis whitei parvus Black, subsp. nov.

Holotype.—Adult male, AMNH 598125, collected by Thomas Carter at 'a rocky kopje [= hill, hillock, mound] on the table-land country' (Carter 1903: 37) of the Cape Range, North West Cape Peninsula, Western Australia, on 21 May 1900. Wing (max. flattened chord) 60 mm, tail (central rectrix from emergence to tip) 82.7 mm, bill length (skull attachment to tip of maxilla) 12.1 mm, bill depth not measured because of damage to the mandible, tail/wing ratio 1.38.

Paratype.—Adult female, AMNH 598126, collected by Thomas Carter with the holotype and a juvenile (AMNH 598124) on the Cape Range tableland, as above on 21 May 1900. Wing 57 mm, tail 82.1 mm, bill length 12.1 mm, bill depth not measured because of damage to the mandible, tail/wing ratio 1.44.

Description.—The holotype and paratype are similar in tone to most *A. w. whitei* and *A. w. oweni*, being rufous above, moderately streaked on the forehead, crown, back and rump, striations formed as brown-edged, whitish central feather shaft-streaks. In contrast, streaking below is almost lacking and restricted to the lower throat and upper breast. The

ISSN-2513-9894 (Online)

underparts are cinnamon, paler towards the midline, resembling the pattern of most *A. w. oweni*, less like the even tone below of *A. w. whitei*. The holotype and paratype are the central two specimens in Figs. 5–6.

Diagnosis.—The subspecies is small, wing and tail lengths being in the lower range and bill lengths below the range of those for *A. w. whitei*. Its measurements resemble those of *A. w. oweni* except that wing lengths are at the upper extreme. Tail/wing ratios for male and female of 1.38 and 1.44, respectively resemble mean figures for *A. w. whitei* (1.39 and 1.42) rather than *A. w. oweni* (1.51 for each sex). It differs from both subspecies in habitat, especially from that of *A. w. oweni*.

Etymology.—The epithet *parvus* is from parvus -a -um, the Latin adjective for small.

Taxonomic rank.—The subspecies appears to be a diminutive variant of the nominate subspecies, its tail and wing lengths slightly reduced, but a much smaller bill being diagnostic. Note that two other passerine species are represented on the North West Cape Peninsula by diminutive isolates, Grey Shrikethrush *Colluricincla harmonica kolichisi* Ford, 1987, and Western Bowerbird *Chlamydera guttata carteri* Mathews, 1920 (Schodde & Mason 1999, Johnstone *et al*. 2013).

Figure 6. Bill profiles of the same specimens as in Fig. 5, from above in reverse order; *A. w. whitei* female AMNH 598127; *A. whitei* (Cape Range) female AMNH 598126; *A. whitei* (Cape Range) male AMNH 598125; *A. w. oweni* male AMNH 598115; note the small size and diminutive bills of the Cape Range specimens (B. Bird)

Type locality, distribution and habitat.—Carter observed grasswrens only twice, and 'at the same locality – viz., a rocky kopje' (Carter 1903: 37) 'on the table-land lying behind the ranges [inland from] the Yardie [Creek]' (Carter 1902: 84), i.e. towards the southern extremity of the range. He described the Cape Range plateau as 'broken table-land, mostly very rugged, with much spinifex, [where] in one place a few cabbage-tree palms occur, which is somewhat remarkable' (Carter 1903: 31). Those relict palms *Livistona alfredii* occur at just one locality on the Cape Range (*c*.22°23'S, 113°54'E), 280 km or more from the nearest populations in the Pilbara (Humphreys *et al*. 1990), and rocky outcrops, perhaps Carter's 'kopjes', are prominent nearby (SRM pers. obs.). We infer that grasswrens are restricted to the limestone plateau of Cape Range and perhaps only to its undissected southern portion. They are isolated from the nominate subspecies by 160 km of lowlands without suitable habitat (R. E. Johnstone pers. comm.). Carter (1903:37) described the type locality as having 'low scrub and patches of spinifex round [*sic*]' with bare patches and emergents, such as 'a [native] fig tree' (*Ficus* sp.). In contrast, G. Lodge (pers. comm. *per* R. E. Johnstone) observed a pair in spinifex on sand hills at the top of the range in the 1980s. The Cape Range is broadly

ISSN-2513-9894 (Online)

vegetated with *Acacia* and other shrubland with isolated eucalypts over hummocks of spinifex (*Triodia*) (Keighery & Gibson 1993). Sand hills are present on the southern plateau and extend onto adjacent dissected plateau (SRM pers. obs.). This evidence distinguishes its habitat on the limestone plateau from that of *A. w. whitei*, spinifex with or without shrubs on ironstone ranges, and of *A. w. oweni*, spinifex with or without low shrubs and eucalypts among desert dunes and interdunes (Higgins *et al*. 2001, Johnstone & Storr 2004, Johnstone *et al*. 2013).

Conservation.—Despite living at Point Cloates near the southern end of the Cape Range for 13 years, Carter (1903: 37) saw the new subspecies at just one locality and we can report just one further corroborated sighting among nine reports (Johnstone *et al*. 2013; R. E. Johnstone pers. comm., Atlas of Living Australia [http://www.ala.org.au], A. Silcocks [BirdLife Australia] pers. comm.). When details have been accessed, most sightings were not from the range itself and misidentification of Rufous Fieldwren *Calamanthus campestris* is likely. A recent unsuccessful transect by S. & N. McGregor on the southern plateau of the Cape Range covered over 20 km of *Triodia* hummock grasslands on both rocky substrate and red dunes. Some areas had been adversely affected by overgrazing, fires and invasion by exotic grasses, but the potential total area is vast, with limited access, and good patches of potential habitat remain on the Cape Range (SRM pers. obs.).

With few observations since Carter's, the subspecies' conservation status is Data Deficient, but it is implausible to assume that it is secure. Depending on whether its distribution includes all or only the southern portion of the Cape Range plateau, its extent of occurrence is between 160 km² and 1,600 km². We infer that it is probably Endangered (IUCN 2012).

Yellabinna Rufous Grasswren

Although North (1901–04: 251) described the distribution of the Black-cheeked [=Striated] Grasswren *Amytis striata* as extending 'from east to west right across the central portion of the Australian continent', he cited no specimen or observational record linking the Great Sandy Desert, Western Australia or central Australia with the Victorian Murray Mallee.

The presence of this grasswren complex on the Eyre Peninsula was first documented by Frank Parsons, who obtained a female (SAMA B23396) near 'Kelly', eight miles (*c*.13 km) south of Kimba on 29 April 1926. Sutton (1926) described its rufous plumage as much lighter than Murray Mallee birds, but Condon (1951: 53) 'was unable to separate [it] from a fairly large sample from the mallee areas of eastern SA and north-western Victoria'.

The Striated Grasswren (group) was first recorded from the southern Yellabinna, western Eyre Peninsula by a party that included ABB & LPP on 21 August 1983. A single specimen was obtained and is described here as the holotype of a new subspecies.

Amytornis whitei aenigma Black, subsp. nov.

Holotype.—Adult male, SAMA B37658, collected by L. P. Pedler in the southern Yellabinna, 50 km [travelled] north of Ceduna, Eyre Peninsula, South Australia (*c*.31°41'S, 133°44'E) on 21 August 1983. Wing (max. flattened chord) 63 mm, tail (central rectrix from emergence to tip) 92.7 mm, bill length (skull attachment to tip of maxilla) 12.2 mm, bill depth (at level of frontal feathering) 4.3 mm.

Paratype.—Adult male ANWC 52262, collected by L. P. Pedler in the southern Yellabinna, 96.6 km [travelled] north of Ceduna, Eyre Peninsula, South Australia (*c*.31°29'S, 133°58'E) on 12 August 2007. Wing 61 mm, tail 90.5 mm, bill length 13.1 mm, bill depth 4.3 mm.

ISSN-2513-9894 (Online)

Description of holotype.—Resembles specimens of *A. striatus*, from which it differs in the following plumage details: upperparts paler but brighter and more orange-rufous (cinnamon-rufous rather than russet) with less defined brownish (not black) edges to white streaking of dorsal feathers.

Description of paratype.—More closely resembles specimens of *A. striatus*, from which it differs in its upperparts being very subtly more orange-rufous rather than russet-toned.

Plumage variation.—The variation in depth of tone and strength of striation is shown in Figs. 2–3. The holotype and paratype are specimens four and three from the left, respectively.

Diagnosis.—Differs from *A. w. whitei* by its smaller bill and less evenly toned underparts, and in habitat. It is larger than *A. w. oweni* with longer wings but its bill is relatively slender. It is distinguished from *A. striatus* and *A. rowleyi* by mtDNA sequencing.

Etymology.—The epithet *aenigma* is a Latin feminine noun for puzzle or riddle.

Taxonomic rank.—The population lies disjunctly between those of the eastern Eyre Peninsula and the Great Victoria Desert but has been little studied, being represented by just a single specimen until recently. The resulting gap in knowledge has hindered resolution of the systematics of the Striated Grasswren complex, now recognised as comprising three species. Ford & Parker (1974) followed Condon (1951) by including Eyre Peninsula representatives within the south-eastern subspecies *A. s. striatus*, and not with all other western forms, which they recognised as *A. s. whitei*. Alternatively, Schodde (1982) and Schodde & Mason (1999) found Eyre Peninsula and Yellabinna populations transitional in a cline between south-eastern and inland desert forms, all included in *A. s. striatus*. Hence, after 'Striated Grasswrens' were detected in the Yellabinna, a component of the Great Victoria Desert, in 1983 they were assumed simply to be of the desert form, now *A. w. oweni* (Carpenter *et al*. 2003). Christidis *et al*. (2013) speculated that the Eyre Peninsula population might be a subspecies of *A. oweni*. The evidence indicates otherwise, yet even now the inclusion of eastern Eyre Peninsula representatives within this subspecies is provisional.

Distribution and habitat.—The subspecies, as described, is known only from the mallee-vegetated dune fields of the southern Yellabinna, western Eyre Peninsula, South Australia. Delimiting records are along a transect between *c*.31°05′S, 133°58′E and *c*.31°41′S, 133°44′E, and in five localities west of that to *c*.31°37′S, 133°13′E (LPP pers. obs., B. Backhouse pers. comm.). Grasswrens have been recorded only from this, the least arid (mean annual rainfall 250–300 mm) and most floristically diverse part of the 44,000 km² Yellabinna region (Copley & Kemper 1992). Its habitat of southern Yellabinna sandplain open scrub of mallee species, including *Eucalyptus yumbarrana* over mid and understorey shrubs and tussock grass *Triodia scariosa* (Copley & Kemper 1992; G. Carpenter and ABB pers. obs.) resembles that of other members of the species complex (Higgins *et al*. 2001). Other records of grasswrens, including specimens, which resemble and are predicted to be included in this subspecies are from the mallee of the eastern Eyre Peninsula, 250–350 km to the south-east, in a similar landform and rainfall regime.

Conservation.—Our present understanding is that this subspecies is restricted to two subpopulations *c*.250 km apart. The conservation status of each is examined separately.

The Yellabinna subpopulation is known from nine sites within less than 2,000 km². Its distribution is patchy and, while it is plausible that more populations will be found in the southern Yellabinna, we do not anticipate a tenfold increase. Recent loss of habitat, e.g. at the holotype locality, and failure to confirm its presence at known sites indicate decline and warrant a status of Near Threatened or Vulnerable under IUCN criteria.

Ford & Parker (1974) inferred from limited information that the eastern Eyre Peninsula subpopulation was 'probably not uncommon', but records are known from only eight

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general localities within a broadly triangular region of *c*.100 km by 50 km. Clearance of the mallee for agriculture has eliminated much potential habitat and, since 1980, there have been reports from just ten sites at six general localities (K. Jones pers. comm.) within *c*.650 km² of its former distribution. One site no longer harbours grasswrens (LPP pers. obs.) following a fire that has eliminated all spinifex *Triodia*. Such a limited extent of occurrence, together with continuing losses warrants this subpopulation being categorised as Endangered (IUCN 2012).

We suggest that, if each subpopulation is of the same taxon, the subspecies is Vulnerable.

Conspectus of subspecies in *Amytornis whitei*

A. w. whitei Mathews, 1910.—The nominate subspecies of the Pilbara, Western Australia, is a large rufous form with an exceptionally large bill, but relatively short tail compared to other larger representatives of the Striated Grasswren complex (Black *et al*. in press). Its distribution across the ironstone Chichester, Hamersley, Ophthalmia and Parry Ranges is bisected by the Fortescue River, with an outlying population south of the Ashburton River in the Barlee Range. It is widely but patchily distributed and generally uncommon (Johnstone & Storr 2004, Johnstone *et al*. 2013).

A. w. oweni Mathews, 1911.—This small rufous form is sparsely distributed through the Tanami, Great Sandy, Little Sandy, Gibson and Great Victoria Deserts, and in sandy landforms among the Central Australian ranges, but extinct in parts of its eastern range beyond Uluru ('Ayers' Rock'). Outlying populations are present west of Wiluna, in the south-west around Queen Victoria Spring (Johnstone & Storr 2004) and in the south-eastern Great Victoria Desert (ABB pers. data). While this and the nominate subspecies are distinct in morphometrics and ecology, their potential zone of interaction has not been studied in detail (Schodde & Mason 1999; R. E. Johnstone pers. comm.).

A. w. parvus Black, 2020.—The Cape Range isolate, although among the earliest to be reported, is little known. Similar to the nominate subspecies but smaller, its tail and wing lengths slightly reduced and the tail/wing ratio similar, but with a much smaller bill. It occurs on a substrate of limestone rather than ironstone. Further investigation is required.

A. w. aenigma Black, 2020.—Eyre Peninsula representatives occur in two separate subpopulations and are larger birds that resemble *A. striatus*. In the west, they have been detected in only a limited part of the southern Yellabinna, *c*.400 km south-east of the closest record of *A. w. oweni* in the Great Victoria Desert. Eastern records are from mallee areas *c*.250–350 km further south-east. A survey of this subspecies is planned.

Acknowledgements

We are grateful to all those who have assisted us with access to and documentation of museum material; Philippa Horton and Maya Penck (SAMA), Ron Johnstone and Rebecca Bray (WA Museum), Katie Date (Museum Victoria), Robert Palmer (ANWC) and Paul Sweet, Mary LeCroy and Bentley Bird (AMNH). We acknowledge the contributions of Gaynor Dolman and Catriona Campbell to the phylogenetic background to this paper. We thank Neil McGregor for his insight into the natural history of Cape Range, Western Australia, Philippa Horton and Bentley Bird for photographs, and Belinda Cale and Brian Blaylock for mapping. We also acknowledge constructive assistance and advice from the editor and reviewers of the submitted manuscript, Wayne Longmore, Ron Johnstone and Richard Schodde. Nomenclature in this paper was reviewed by the Working Group on Avian Nomenclature of the International Ornithologists' Union.

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ISSN-2513-9894 (Online)