

Brown Thornbills in South Australia: recognising the Mount Lofty Ranges subspecies *Acanthiza pusilla samueli* Mathews, 1913.

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Abstract

While the distributional limits for Brown and Inland Thornbills in the upper Southeast of South Australia remain unclear, the former certainly extends continuously from the lower Southeast in woodlands bordering the Coorong to a little north of Salt Creek. There they are replaced by Inland Thornbills, which occupy mallee communities through to the Coorong shore. Mount Lofty Ranges Brown Thornbills extend southeast to islands of the Lower Lakes and perhaps to the Narrung Peninsula but east of Lake Albert they are replaced by Inland Thornbills. Mount Lofty Ranges Brown Thornbills thus constitute an isolated population within the species. They are also phenotypically distinct from Coorong and South-eastern Brown Thornbills, being darker and showing brighter rump patches. They therefore warrant recognition as a separate subspecies.

INTRODUCTION

The respective distributions of Brown Thornbill, *Acanthiza pusilla*, and Inland Thornbill, *A. apicalis*, in eastern South Australia (SA) are not well established, in part because of their similarity. They are not sister species but are closely related and were treated as conspecific in the mid 20th century and again in the late 1980s and early 1990s (see below for the current consensus and the Appendix for a summary of their taxonomic history). Separation of the two is through a combination of features (Schodde and Mason 1999, Higgins and Peter 2002). The Brown Thornbill has a proportionately shorter tail which is rarely cocked; its forehead is browner (a diffuse reddish brown in some non SA populations) with narrower and less contrasting buff to brown

feather-tips, compared with the Inland Thornbill where a more strongly patterned whitish to buff scalloping contrasts with darker feather bases. The Brown Thornbill's brownish upper parts have an olive rather than a greyish cast; the rump patch is less rufous and less contrasting; the black sub-terminal tail band is generally narrower (although with overlap); tipping of outer tail feathers is not as pure or as extensively white and the under tail tends to creamy yellow rather than pale buff brown or whitish. Schodde and Mason (*loc. cit.*) also showed that its feet (tarsus and toes) are deep flesh-grey rather than dusky-black. But there is much variation within each species and some overlap between them, especially in south-eastern Australia where they come into contact and where evidence of hybridisation has been demonstrated (Boles 1983, Norman 1987, Matthew 2002). In the hand the black feet and pure white tipping in the tail of the Inland Thornbill are reliable identifiers. In the field the tail cocking, the paler and more contrasting forehead scalloping, pale face, generally greyer overall appearance, reduced or absent olive tones and almost white underparts of the Inland Thornbill are all guides (Higgins and Peter 2002, Kent Treloar pers. comm., AB pers. obs.).

While Boles (1983) reported what appeared to be extensive hybridisation between Brown and Inland Thornbills in south-eastern SA and Norman's (1987) unpublished honours thesis described a zone of hybridisation on the western slopes of the Great Dividing Range, Christidis and Boles (1994) listed them as separate species. They based their decision on behavioural and ecological differences and differentiation in

allopatry and with support from unpublished genetic data (L. Christidis pers. comm.). Christidis and Boles (2008) maintained the separation, citing the mitochondrial and nuclear DNA evidence of Nicholls *et al.* (2000) and Nicholls (2001) respectively. The former study showed the Brown and Mountain, *A. katherina*, Thornbills to be sister species with the Inland Thornbill sister to that pair, i.e. more distantly related. The latter study was uninformative but reported unpublished data from the earlier study of uncorrected DNA-sequence distances between the Brown and Inland that were greater than between sympatric Brown and Tasmanian Thornbills, *A. ewingii*. That assertion directly contradicted the previously published consensus tree which found the Tasmanian Thornbill to be the most distantly related of all four. Gardner *et al.* (2010) sequenced nine gene regions including both mitochondrial and nuclear DNA in a phylogeny of the Meliphagoidea and supported separation of the two by confirming that the Brown and Mountain Thornbills are sister species to the exclusion of Inland and Tasmanian Thornbills.

Earlier Schodde and Mason (1999) provided taxonomic circumscriptions for both species and addressed their interactions in regions of parapatry or sympatry. The intergradation found by Norman (1987) was abrupt and was attributed to habitat choice by each species, the Brown for sclerophyll forest and Inland for Native Pine, *Callitris*, and mallee. Boles (1983), they found, had detected intergradient individuals among parental forms in south-eastern SA, suggesting an interaction between separate species. Finally, in the coastal shrubberies of eastern Gulf St Vincent, they found the two to be in contact without intermediate forms. The evidence indicated effective reproductive isolation despite the occurrence of hybridisation.

There is thus much corroborative evidence that Brown and Inland Thornbills are separate species but they can be difficult to separate in the field. There remain many unanswered

questions regarding their distribution, overlap and extent of hybridisation in south-eastern Australia. In this paper I review the distribution of Brown and Inland Thornbills in and around the Mount Lofty Ranges (MLR), Lower Murray Lakes and the south-east (SE) of SA and report on an examination of museum specimens of SA Brown Thornbills in a phenotypic analysis of its populations in the State.

MATERIALS AND METHODS

I first collated distributional data on Brown and Inland Thornbills in SA, including specimens in the South Australian Museum, Adelaide (SAMA) and Australian National Wildlife Collection, CSIRO Canberra (ANWC) and sight records in the databases of Birds SA, Biological Survey SA and BirdLife Australia. That review led to the inference that the MLR and SE Brown Thornbill populations might be isolated from one another between Lake Albert and Salt Creek on the Coorong. I made enquiries of experienced field observers concerning their observations of both species in South Australia. I made five field trips to achieve personal observations of the populations of each species in the area east and south-east of Lake Albert to Salt Creek and Messent and Martin Washpool Conservation Parks (CP). I examined all specimens in SAMA, comparing dorsum and rump tones among three SA Brown Thornbill populations, SE, MLR and Kangaroo Island (KI), using the Naturalist's Color Guide (Smithe 1975).

RESULTS

Distribution

Maps combining sight records from the source databases showed heavy and consistent Brown Thornbill records from the southern MLR, KI and in the SE to a little north of Bangham and Padthaway and west along the Coorong as far as Salt Creek. Most but not all Inland Thornbill records were from outside the above area but there were many records of Brown Thornbills from areas considered likely to be exclusively

occupied by Inland Thornbills and there was a considerable overlap of the two in the upper SE. In view of the acknowledged difficulties of identification in the field and the impracticality of interpreting unannotated sight records, the above results could only form a basis for further evaluation.

There are museum specimens of the Brown Thornbill in the SE north to Bangham, Padthaway and 25 km west of Keith and west to Salt Creek (nine skins) and Policeman's Point, nine km further northwest (ANWC E O4851). Of four taken near Meningie by Parsons in 1923 one was considered a possible hybrid (SAMA B22644, Matthew 2002); the other three (SAMA B22645, B22651 and B22657) and two from Culburra (SAMA B26600 and B26811) have all been re-identified as Inland Thornbills and confirmed as such by recent reviewers (Schodde and Mason 1999, Matthew 2002). Other Inland Thornbill specimens are from Coomandook, Coonalpyn and Coombe.

While the specimen evidence might therefore allow an inference that the two species are allopatric, Possingham and Possingham (2000) found a broad region of overlap in the upper SE, distinguishing the two largely on behavioural characteristics and habitat choice (Max Possingham pers. comm.). Their map (Figure 2, p 200) showed the Brown Thornbill (in gum woodland) north to Bangham, Keith, Tintinara and Coonalpyn and continuing further northwest beyond Salt Creek and Coonalpyn, implicitly to the Lower Murray Lakes. They mapped the Inland Thornbill (in mallee and native pine) south to Messent, Gum Lagoon, Mount Scott and Fairview Conservation Parks (CPs) and Bangham but not to the Coorong. There are records of both species from Messent and Martin Washpool CPs in the Salt Creek hinterland, confirmed in the latter by Graham Carpenter (pers. comm.) who has found the Brown Thornbill in *Melaleuca brevifolia* shrubland and the Inland Thornbill in sandy mallee.

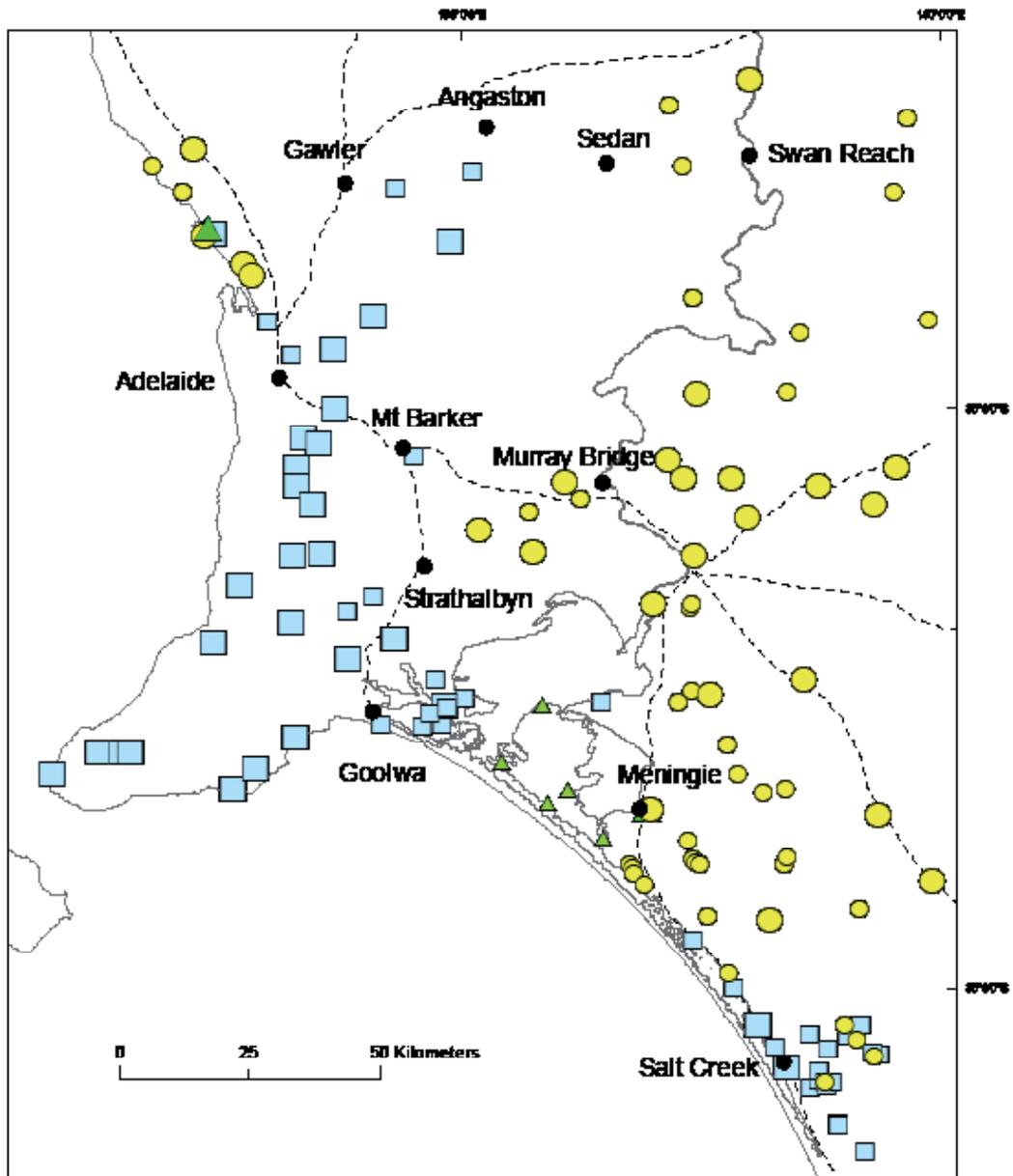
In the Mount Lofty Ranges, specimen and confirmed sight records are in close agreement, with Brown Thornbills ranging north to around Williamstown, Mount Crawford (ANWC 46499) and Para Wirra, Sandy Creek and Kaiserstuhl CPs (Clarke 1966, Rix 1976, AB pers. obs., Birds SA data). A century ago there were Inland Thornbill records in woodland and mallee north of Gawler and near Lower Light (Ashby in Mathews 1921-1922, SAMA B23107) but there is now a gap of over 50 km to the Tothill Ranges in the north (ANWC 18685) and to the mallee beyond Truro and Sedan in the east (Paton, Carpenter and Sinclair 1994).

There were few early reports of Brown Thornbills on the Adelaide Plains, e.g. at Lockleys (Mellor 1924), Happy Valley (Rix 1942) and Willunga (Symon 1946) but in recent years they have been reported from planted shrublands associated with the Dry Creek estuary and Little Para River wetlands and in casuarinas at Buckland Park Lake on the Gawler River (D. Carter, G. Carpenter pers. comm., AB pers. obs.).

Schodde and Mason (1999) found both species in close contact in the St Kilda-Port Gawler area, the Inland Thornbill extending north in the mangroves of Gulf St. Vincent. Thornbills seen recently (by D. Carter, G. Carpenter and AB as above) in mangroves between Torrens Island and Middle Beach have appeared atypical and have not shown tail cocking, raising some uncertainty about their taxonomic status and Matthew (2002) found that one specimen from the area (SAMA B22648) appeared to be hybrid.

On the eastern margin of the MLR Brown Thornbills "stick to the hills" (the late John Eckert pers. comm.) but extend east to Muntiri Heritage Area south of Milang (Eckert 2000), where they occur irregularly (AB pers. obs.), Point Sturt Peninsula (a small resident population, Nat Doecke pers. comm., AB pers. obs.), Goose Island near Clayton (J.M. Bonnin SAMA B47499) and Hindmarsh Island (Newell 1927, Sutton 1932, Paton, Carpenter and Sinclair 1994). North

Figure 1. Specimens (large symbols) and sight records (small symbols) of Brown Thornbills (blue squares) and Inland Thornbills (yellow circles) in eastern South Australia between Gulf St Vincent, the southern Mount Lofty Ranges, Murray Mallee, Lower Lakes and Coorong. Possible hybrid specimens and incompletely identified sight records are shown as green triangles.



- Brown Thornbill - large symbol (specimen); small (sighting)
- Inland Thornbill - large symbol (specimen); small (sighting)
- Identity uncertain - large symbol (specimen); small (sighting)



of these localities, at Ferries-McDonald and Monarto CPs (Eckert 2000), Hartley (SAMA B18731 and B47188), Wellington (SAMA B7252) and east of Monarto (AB pers. obs., Birds SA data) the Thornbills are *A. apicalis*.

There are few records on the eastern side of Lake Alexandrina including the Narrung Peninsula, most dating from the time when only one species was recognised; and there are no specimens from this area to establish their identity. A single Inland Thornbill record was shown from the south-eastern Narrung Peninsula in the second Adelaide region bird atlas (Paton, Carpenter and Sinclair 1994). "Brown Thornbills" [i.e. either species] were reported from Lake Albert at the south-eastern extremity of the Narrung Peninsula (Sutton 1931) and from the Salt Lagoon Islands on its western fringe (Beruldsen 1963, Close *et al.* 1982, David Close, pers. comm.). I did not find either Thornbill during a single visit to the islands, nor have I found them elsewhere in remnant vegetation on Narrung Peninsula, including Potter's Scrub on the Coorong.

Long time Narrung Peninsula resident David Dadd (pers. comm.) has no recent record of either species. Graham Carpenter made two observations of single birds in Native Pine scrub east of the Narrung narrows near Poltalloch that he considered to be Brown Thornbills. The late John Eckert (pers. comm.) asserted that east and southeast of the lakes there were only "Red-tailed, typical *hamiltoni*" [=Inland Thornbills; see Appendix], and he knew of no Brown Thornbill record northwest of Salt Creek. That view was followed by Paton, Carpenter and Sinclair (1994),

who published six records of Inland Thornbills east of Lake Albert, including the Poltalloch site and none of the Brown Thornbill. Graham Carpenter (pers. comm.) likewise has several records of Inland Thornbills in the mallee heath communities southeast of Meningie to the margins of the Coorong, with one probable Brown Thornbill sighting near Villa dei Yumpa about 30 km north-west of Salt Creek. My own observations are of Brown Thornbills in Messent and Martin Washpool CPs, at and near Salt Creek and c 21 km northwest, near Woods Well. My Inland Thornbill records are in the mallee remnants northeast, east and south of Meningie, including Bonney's Reserve on the Coorong where there are several other records of that species (Figure 1).

Plumages

Phenotypic variability was evident among the 57 Brown Thornbill specimens from SA. MLR specimens were consistently darker and there was no evidence of intergradation between them and those from the SE and Coorong area (Salt Creek) which were indistinguishable. SA Brown Thornbills thus fell into three phenotypically distinct groups (MLR, KI, and SE including the Coorong) (Table 1) and their separation was recognised by each of four independent observers. While all three populations show the typical olive cast that distinguishes Brown from most Inland Thornbills, SE and Salt Creek birds are consistently paler and greyer. MLR birds are as dark as those from KI but have brighter and redder rump patches (raw umber) that are also brighter than those from the SE which are a sandy brown (clay to cinnamon) (Figure 2).

Table 1. Plumage tones in three SA populations of Brown Thornbill.

population	dorsum	rump
SE (N = 9) + Coorong (N = 8)	Between smoke grey (45) and drab [dull brown] (27) and olive (30)	Clay (26) to between antique brown (37) and cinnamon (39)
MLR (N = 27)	Between brownish olive (29) and olive brown (28)	Between raw umber (23) and antique brown (37)
KI (N = 13)	Between brownish olive (29) and olive (30) or olive brown (28)	Between fawn (25), clay (26) and antique brown (37)



Figure 2. Brown Thornbills, showing the darker dorsal tone and brighter rump patch of MLR birds. SAMA B30261 Parsons Head, MLR; SAMA B22638 Salt Creek, Coorong

The distinction between MLR and SE Brown Thornbills is also evident on the ventral surface, the former showing darker and browner flanks and consistently bold and contrasting throat and breast streaking (Figure 3), this last varying among SE birds. Contrast between dorsal and rump tones is greater in SE and MLR than in KI birds.

DISCUSSION

Schodde and Mason (1999) wrote that the Brown Thornbill extended from southern Victoria into the SE of SA, north to Naracoorte and Keith and along the Coorong to the MLR. On the other hand their maps showed a gap in its distribution between the mid Coorong and the MLR with the Inland Thornbill extending to the Coorong between a little north of Kingston SE and Lake Albert. I find that between a little north of Salt Creek and southwest of Lake Alexandrina (Hindmarsh Island and Point Sturt Peninsula) there is a gap in the distribution of Brown Thornbills with only a handful of sight records of uncertain identity from the periphery of the



Figure 3. Brown Thornbills, showing the browner flanks and stronger streaking of MLR birds. SAMA B22642 Cape Jervis, MLR; SAMA B30261 Parsons Head, MLR; SAMA B22638 Salt Creek, Coorong and SAMA B26812 Naracoorte, SE.

Narrung Peninsula (Sutton 1931, Beruldsen 1967, SAOA 1977, Close *et al.* 1982), and two sightings near Poltalloch, east of Narrung (G. Carpenter pers. comm.).

Those records suggest that MLR Brown Thornbills were (and possibly remain) distributed in limited dense vegetation such as Coastal Tea Tree, *Melaleuca halmaturorum*, tall shrubland fringing southern parts of the Lower Lakes, although the Poltalloch observations were in Native Pine, *Callitris*, woodland, a more typical habitat for Inland Thornbills. They also provide a feasible basis for the possible former occurrence of limited hybridisation in the Meningie area, with mallee communities to the east formerly extensively but now patchily occupied by Inland Thornbills whose distribution overlaps with Brown Thornbills in the SE but not in the MLR. MLR Brown Thornbills are isolated from those in the SE by a range extension of Inland Thornbills from the Murray Mallee and upper SE to the Coorong and are distinguished from them phenotypically, as shown above.

Schodde and Mason (1999) recognised five subspecies of Brown Thornbill, two occurring in SA. They found variation within nominate *A. p. pusilla* of the south-eastern Australian mainland but no consistent patterns of difference between MLR, southern Victorian and east coast Brown Thornbills of that subspecies, all regions including some equally dark examples. They accepted the KI population as a darker subspecies *A. p. zietzi* with a relatively non-contrasting rump, as confirmed by Higgins and Peter (2002) and in this study. Matthew (2002) noted variation in different parts of the range of *A. p. pusilla* in Victoria and New South Wales but found, as I have here, that MLR birds are darker dorsally than those from the SE and have brighter and richer rump patches. These phenotypic distinctions are consistent in all MLR and all SE (including Coorong) specimens examined. While phenotypic variation can be clinal within a continuous population (as may be the case in the eastern Victorian and New South

Wales population of *A. p. pusilla*), and may be responsive to ecological factors such as substrate and relative humidity (Gloger's rule), the plumage differences shown between MLR and SE Brown Thornbills are neither clinal nor consistent with eco-phenotypic variation in other taxa such as the Chestnut-rumped Heathwren, *Calamanthus pyrrhopygius*, whose MLR subspecies *C. p. parkeri* is paler than nominate *C. p. pyrrhopygius* in SE SA (Schodde and Mason 1999).

Distinctive geographically partitioned variation between discrete populations reflects local adaptation at some level and may be treated taxonomically under the biological species concept by recognising subspecies (Winker 2010). The evidence produced above shows that the MLR Brown Thornbill is consistently and distinctively plumaged and is apparently an isolated population within the species. It should therefore be recognised as a subspecies to reflect its status as a primary unit of conservation concern (Remsen 2010). Mathews (1913) described Brown Thornbills from the Mount Lofty Ranges as the subspecies *Acanthiza pusilla samueli* and that name is available for the subspecifically distinct MLR population. I also draw attention to the occurrence of a consistently paler population in the SE with a presently undefined eastern distributional limit. Knowledge of the distribution of Brown and Inland Thornbills in the upper SE, their movements, range overlap, habitat choice and extent of hybridisation, remains incomplete and requires further study.

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APPENDIX

Summary of the taxonomic history of *Acanthiza pusilla* and *Acanthiza apicalis*

For simplicity only the currently used genus name *Acanthiza* Vigors and Horsfield, 1827 is applied and closely related thornbills from northern Queensland *A. katherina* and Tasmania *A. ewingii* are not discussed.

Gould knew of the Brown Thornbill *Acanthiza pusilla* (Shaw, 1790) of eastern Australia before his Australian visit in 1838-1840. He subsequently described two new species; *A. apicalis* Gould, 1847 from the Swan River colony and

A. pyrrhopygia Gould, 1847 from "the Belts of the Murray" [=western Murray Mallee].

North (1901-1904) stressed the strong similarity between western *A. apicalis* and eastern *A. pusilla* and found that some South Australian birds, such as the Kangaroo Island form *A. zietzi* North, 1904, presented intermediate features. He felt that the distinctively bright uppertail coverts of the Rufous-rumped Thornbill *A. pyrrhopygia* argued for its separation as a species and recognised a similarly bright-rumped inland New South Wales form as *A. albiventris* North, 1904.

Mathews (1921-1922) acknowledged similarities within the *A. pusilla*-*A. apicalis* complex but found even greater regional variation so that, at a stage when taxonomists were beginning to recognise infra-specific division, he named 23 subspecies within one species *A. pusilla*, being unable to resolve a separation into two. Curiously Edwin Ashby (in Mathews 1921-1922) had provided a well supported dichotomous treatment of the *A. pusilla*-*A. apicalis* complex which reads as a very modern interpretation. Ashby had seen *pusilla* in Queensland, New South Wales, Victoria and South Australia and found "the notes and habits of all to be similar". He had observed "the 'apicalis' group" in the Murray Mallee of SA and Victoria [*A. hamiltoni*], on Eyre Peninsula, "twenty-five miles north of Adelaide in the Ti-Tree (*Melaleuca*) and Mallee" and in "the Mangroves bordering the Gulf". Then in Western Australia he saw it in the Goldfields and in "the wet parts of that State". He found the notes distinct and the tail "exceptionally long and carried at a decided angle of elevation quite different from *pusilla*".

Mathews (1921-1922) could only conclude that there were some populations within the *pusilla* group and others of the "*pyrrhopygia*" type. Within the former he included all that we now recognise as *A. pusilla* and in the latter all of the paler and richly red-rumped inland and Murray Mallee forms of *A. apicalis* but he could not place those from south-western Australia and Eyre Peninsula in either because he considered their phenotypes to have intermediate features. In his subsequent synopsis, Mathews (1930) drifted even further from Ashby's lucid analysis, political rather than biological boundaries leading him to include all Victorian birds in *A. p. macularia* and all SA mainland forms in *A. p. hamiltoni*.

The official checklist (RAOU 1926) did not recognise infraspecific division but named five southern mainland forms as species; Brown Thornbill, *A. pusilla*, of south-eastern Australia including SA and Tasmania; Broad-

tailed Thornbill, *A. apicalis*, of southern Western Australia; Inland Thornbill, *A. albiventris*, of inland Queensland and New South Wales; Whitlock Thornbill, *A. whitlocki*, (North, 1909) of inland Western Australia; and Red-tailed Thornbill, *A. hamiltoni*, (Mathews, 1911) of north-western Victoria, SA and central Australia, the last name replacing *A. pyrrhopygia* which was found to be invalid.

Mayr and Serventy (1938) embraced the polytypic species concept and so all the RAOU species became subspecies within *A. pusilla* once more (e.g. Condon 1968) but, in an interim list of Australian passerines, Schodde (1975) separated *A. apicalis* as a species (with subspecies *A. a. albiventris*, *A. a. whitlocki* and *A. a. hamiltoni*). Then came the studies of Boles (1983) and Norman (1987), described in the main text, which suggested that hybridisation might occur wherever two forms were in contact, leading Schodde and Tidemann (1986) and Sibley and Monroe (1990) to combine them in a single species once more.

Schodde and Mason (1999) identified two species and addressed the question of the intermediate features that had suggested hybridisation in the upper SE of SA. They showed that Inland Thornbills from that region resemble *A. a. apicalis* from south-western Australia and concluded that all southern Inland Thornbill populations, including those on Eyre and Yorke Peninsulas belonged to that darker, olive toned *pusilla*-like subspecies. They argued that the strongly contrasting bright red rump patches of thornbills ("*pyrrhopygia*" or "*hamiltoni*") in the Murray Mallee resulted from introgression from the inland eastern subspecies *A. a. albiventris*.

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