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The Otway Forester *Strepera graculina ashbyi*: A neglected and misunderstood subspecies of the Pied Currawong from southern Victoria

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Abstract. The most southerly of the six described subspecies of the Pied Currawong, *Strepera graculina ashbyi*, is perhaps the least known and most controversial. Because it has reduced areas of white at the bases of the primaries and at the bases of the rectrices, its appearance is superficially similar to the Grey Currawong *S. versicolor*, and this has caused confusion from the time of its first description to the present day. Subspecies *ashbyi* is considered to be extinct by some authorities, yet our observations indicate that birds showing the phenotypic characteristics of *ashbyi* are common breeding residents in the Otway Ranges of southern Victoria and in the regional city of Geelong and surrounding areas. Here we review the taxonomic history, morphological characteristics and current status of *S. g. ashbyi*. We identify errors of citation and misinterpretation of the literature which, combined with a lack of ground-truthing, have resulted in the classification of a seemingly common taxon as Extinct. We then present a re-assessment of the distribution and biogeography of *S. g. ashbyi* and discuss the suitability of the type specimen. The true taxonomic status of *S. g. ashbyi* can probably only be determined by studies of rates of genetic introgression amongst Pied Currawong populations across western Victoria, but in the meantime its conservation status should be revised to Least Concern.

Introduction

The Pied Currawong *Strepera graculina* is a common forest bird along the entire eastern coast of Australia, and is a familiar visitor to many towns and suburbs, with increasing resident populations in regional cities. It varies from north to south by exhibiting increasing size, reducing bill length, paling of black plumage to slate, and diminishing extent of white in the primaries and tail base (Schodde & Mason 1999). Schodde & Mason (1999) concluded that this variation is stepped, not clinal, and on that basis listed five subspecies on mainland Australia and one on Lord Howe Island.

The most southerly subspecies of the Pied Currawong, *S. g. ashbyi*, is a poorly known and little understood form of this otherwise well-known and common species. *S. g. ashbyi* is of particular interest because it is considered Extinct by some authorities (Garnett *et al*. 2011; BirdLife Australia 2016). However, birds showing the plumage characteristics of *ashbyi* are common and are the dominant form of Pied Currawong in the Otway Ranges, Otway Plain and eastern Warrnambool Plain bioregions in southern Victoria (PM & CM pers. obs.). The threatened status of *ashbyi* under relevant State and Commonwealth legislation also varies: it is listed as Endangered under the South Australian *National Parks and Wildlife Act 1972* (DEWNR 2014), is not listed as Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* nor is it listed in Victoria's advisory list of threatened vertebrate fauna (DSE 2013), and is considered an inadequately differentiated taxon for the purposes of listing under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth of Australia 2015).

Here we collate and critically review available information about the taxonomic history, field identification, distribution, habitat and biogeography of *S. g. ashbyi* in the hope of directing greater attention to it, so that its distribution and ecology can be more closely defined, its taxonomic status clarified and its conservation status agreed. In the following text, statements in square brackets are explanatory information added by the authors into passages quoted from the literature.

Taxonomic history

Since its first description, there have been divergent views about the circumscription of *S. g. ashbyi*. It was described by Mathews (1913, p. 78), who gave only a brief description: "differs from *S. g. graculina* by its smaller size and lighter colour". Mathews gave the type locality as 'Black Spur, Victoria' and the collection date as 8 May 1901. Presumably 'Black Spur' refers to the southern fall of the Great Dividing Range between Fernshaw and Narbethong in the Yarra Ranges north-east of Healesville. The stretch of road to Dom Dom Saddle (now part of the Maroondah Highway) has carried the name Black Spur (originally Black's Spur) since the 1860s in recognition of its use by Aboriginal people from northern Victoria who were coerced into moving to a mission settlement at Corranderrk near Healesville. In support of this assumption is RAOU (1926), which lists the type locality as 'Black Spur, Healesville'. No collector is mentioned by Mathews (1913) or RAOU (1926), but Amadon (1951) examined the type specimen, held in the collections of the American Museum of Natural History (AMNH) (specimen number 673622), and determined, from information associated with the specimen, that the collector was Edwin Ashby, for whom the taxon was named by Mathews.

Amadon (1951, p. 26) also stated that the type specimen is "obviously immature". Examination of digital images

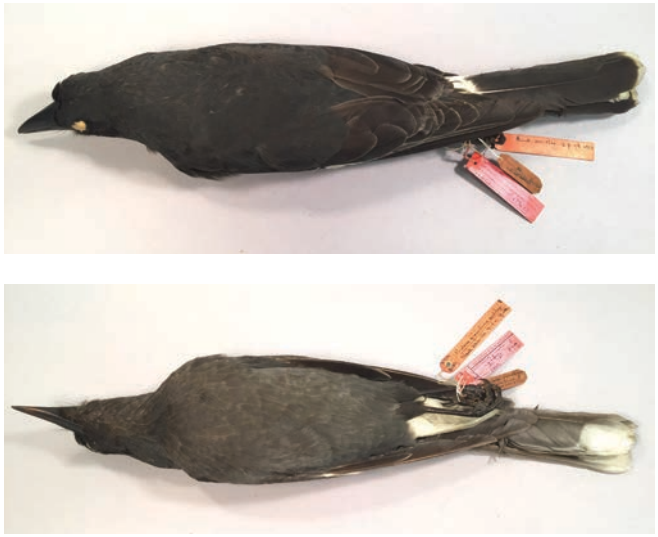

Figure 1. The type specimen of *Strepera graculina ashbyi* (AMNH 673622): upper image—dorsal view with bases of some rectrices exposed, lower image—ventral view. Photos courtesy American Museum of Natural History.

Figure 2. The type specimen of *Strepera versicolor riordani* (AMNH 673621), now subsumed in *S. graculina ashbyi*: upper image—dorsal view, lower image—ventral view. Photos courtesy American Museum of Natural History.

of the type specimen (Figure 1) supports Amadon's conclusions about its age, and the labels clearly indicate that it is female, presumably based on dissection of the gonads. That the bird was immature when collected (a few months old, hatched in the spring or summer before it was collected in May) is indicated by the pointed rectrices, and the somewhat worn appearance—adults would be in fresh plumage in May. The pale shaft-streaks in the feathers of the underparts are also indicative of an immature bird (D. Rogers pers. comm.).

Mathews (1913) also described a subspecies of what he considered to be the Grey Currawong, with the name *Neostrepera versicolor riordani.* The type locality was given as 'Geelong, Victoria' and the collection date of the type specimen as 29 April 1913. The type specimen of *riordani* is also in the AMNH (specimen number 673621) (Figure 2), and the specimen labels indicate that it was actually collected at Aireys Inlet, which is on the Bass Strait coast on the eastern fringe of the Otway Ranges, ~45 km south-west of Geelong. Mathews considered this subspecies to belong to the Grey Currawong *Strepera versicolor*, but others soon recognised that it was actually a form of the Pied Currawong (e.g. RAOU 1926; Ashby 1927). Mathews (1930) revised the specific identity of *riordani* to *Strepera graculina*, thus correcting the first example of confusion between *S. g. ashbyi* and *S. versicolor*.

Based on six Pied Currawong specimens from Victoria in the AMNH, Amadon (1951, p. 27) considered that Pied Currawongs across all of Victoria warranted "racial separation" as a single subspecific taxon, for which *ashbyi* was the appropriate available name. However, Amadon (1951, p. 27) admitted that there was considerable variation and that examination of additional material was needed, particularly as "the type of *ashbyi* is obviously immature and others [specimens in the AMNH] may be". Despite this, Amadon (1951, p. 26) felt able to describe the distribution of *ashbyi* as coinciding "more or less with the boundaries of Victoria", while indicating that it may also occur in South Australia near the border with Victoria.

Schodde *&* Mason (1999, p. 554) also rejected *riordani* as a valid taxon and subsumed it into *ashbyi* which they considered a valid subspecies that is "Restricted today to western Vic[toria]". Schodde *&* Mason (1999) also described a new subspecies, *nebulosa* from central and eastern Victoria, south-eastern New South Wales and the Australian Capital Territory, which is intermediate in many plumage features between the nominate subspecies *graculina* and *ashbyi* (see also Matthew 2006). That is, Schodde *&* Mason (1999) split Amadon's variable and widespread conceptualisation of *ashbyi* into two subspecies—*nebulosa* and *ashbyi*, with *ashbyi* including *riordani*.

Distinguishing *Strepera graculina ashbyi* from *S. g. nebulosa*

Morphological differences between the two subspecies are not clear-cut and are difficult to quantify.

Schodde *&* Mason (1999, p. 553) listed the distinguishing features of *ashbyi* as:

> Dorsum *sooty-slate*; white wing speculum *vestigial*, restricted to base of primaries 5 – 8, extending *only 5 – 10mm beyond* black wing coverts on primary 7 in folded wing; ventrum *sooty*, grading slate-grey over belly; white tail base *very narrow*, *c* 40 – 50mm deep, *hidden* by sooty-slate upper-tail coverts and white under-tail coverts; white tail tip broad, *c* 30 – 40mm deep on inner vane of outermost rectrices; size *medium-large*, with long tail and *short bill…*

In comparison, Schodde *&* Mason (1999, p. 552) stated that *nebulosa* has:

> white wing speculum *medium-small*, extensive on primaries 4/5 – 9, extending *20 – 30mm beyond* black wing coverts on primary 7 in folded wing….white tail base *medium to narrow*, *c* 60 – 75mm deep, extending *0 – 15mm beyond* sooty central upper-tail coverts (but always exposed at sides)….size *large*, with long tail and *short bill…*

Matthew (2006, p. 553) provided further detail, which we summarise as:

ashbyi compared with *nebulosa* has:

1. Slightly paler upperparts *(ashbyi* representing the end-point in a north–south cline of darker to paler body plumage),
2. Slightly longer white tip to tail (P <0.05) (in *ashbyi*, inner web of T6 is 30–38 mm; mean 34.3 mm ± standard deviation 3.06 mm; n = 8) and shorter white bases to rectrices (P <0.01), hidden by uppertail-coverts in some birds (in *ashbyi*, length of white at base of T1 is 35–80 mm; mean 54.7 ± 15.65 mm; n = 7), and
3. White patches on primaries significantly smaller (P <0.01) (in *ashbyi*, white on P6 extends past tips of greater primary coverts by 2–31 mm; mean 14.2 ± 11.40 mm; n = 8).

nebulosa compared with nominate *graculina* (distribution: central eastern New South Wales to central eastern Queensland) has:

1. Slightly paler upperparts (sooty black cf. black),
2. Slightly paler underparts (sooty grading to slate-grey over belly cf. entirely sooty black),
3. Longer white tips to rectrices (P <0.05) (in *nebulosa*, white tip on inner web of T6 is 26–41 mm; mean 31.1 ± 4.29 mm; n = 21) and shorter white bases to rectrices (P <0.01) (in *nebulosa*, length of white at the base of T1 is 40–85 mm; mean 71.5 ± 10.53 mm; n = 21), and
4. Significantly smaller white patch on primaries (P <0.01) (length of white on P6 of *nebulosa* extends past tips of greater primary coverts by 22–36 mm; mean 28.1 ± 4.12 mm; n = 15).

Matthew (2006, p. 553) further stated:

> Above data suggest that variation in extent of white at base of rectrices and size of white patch on primaries [in *ashbyi*] much greater than variation within *nebulosa* or nominate, perhaps supporting notion that populations in w. Vic. are intergradient.

However, examination of the 'above data' does not entirely support this statement. Based on Matthew's allocation of specimens to one or other of the possible subspecies, variation in the length of white at the base of the tail is not different between the two subspecies: 35–80 mm in *ashbyi* vs 40–85 mm in *nebulosa*. Variation in white on P6 is greater in *ashbyi* than *nebulosa*: 2–31 mm vs 22–36 mm respectively.

The differences described by Schodde *&* Mason (1999) and Matthew (2006) that are most useful as field characters are summarised in Table 1 and illustrated in Figures 3, 4 and 5.

The significance of moult and age class

The circumscription of *ashbyi* is problematic because of variation and overlap in the defining characters, overlain by sex and age-class considerations. According to Matthew (2006, p. 549), Pied Currawongs

> fledge in juvenile plumage. Undergo a partial post-juvenile (first pre-basic) moult to adult-like first immature (first basic) plumage. Acquire adult plumage in complete first immature post-breeding (second pre-basic) moult, probably when c. 1 year old. Thereafter, a complete post-breeding (pre-basic) moult each cycle produces successive adult (basic) plumages with no change in appearance.

Importantly for this discussion, all juvenile rectrices are retained in the first immature plumage, i.e. are retained until the second pre-basic moult occurs at *c*. 1 year of age. Features of juvenile rectrices in the Pied Currawong are:

1. a V-shaped tip, and
2. they have less white at the base, mostly concealed by the uppertail-coverts.

This means that all birds <1 year old will have reduced white at the base of the tail, regardless of subspecies, so there is a risk of misidentifying immature birds of other subspecies as immature or even adult *ashbyi*. Further, adults of any subspecies with actively growing rectrices could also show limited or no white at the base of the tail. Therefore, to be certain of subspecific identity, it is critical

Table 1. Summary of plumage differences between Pied Currawong subspecies *Strepera graculina nebulosa* and *S. g. ashbyi* that are most useful as field characters. Speculum projection is beyond greater primary coverts in folded wing; width of white tail base is measured on inner vane of outermost rectrix.

Source	*Subspecies*	*Field character*		
		White speculum	*Speculum projection*	*Width of white tail base*
Schodde & Mason (1999)	*nebulosa*	Medium–small, extensive on primaries 4/5–9	20–30 mm on P7	~60–75 mm, extending 0–15 mm beyond sooty central uppertail-coverts (but always exposed at sides)
Matthew (2006)	*nebulosa*		22–36 mm on P6, mean 28.1 mm	40–85 mm, mean 71.5 mm
Schodde & Mason (1999)	*ashbyi*	Vestigial, restricted to base of primaries 5–8	5–10 mm on P7	~40–50 mm, hidden by sooty-slate uppertail-coverts and white undertail-coverts
Matthew (2006)	*ashbyi*	Significantly smaller than *nebulosa*	2–31 mm on P6, mean 14.2 mm	35–80 mm, mean 54.7 mm

Figure 3. Images highlighting the main plumage differences between *S. g. ashbyi* (A and C) and *S. g. nebulosa* (photographed in Canberra) (B and D). Image A shows the uppertail-coverts parted to reveal the white band at the base of the tail, which would normally be obscured, as in image C. Images B and D show the broad band at the base of the tail, extending well beyond the uppertail-coverts, and the extensive white speculum of *S. g. nebulosa*. Photos: (A) Adam Fry, (B) Peter Menkhorst, (C) Craig Morley, and (D) Peter Menkhorst

Figure 4. An adult Pied Currawong subspecies *ashbyi* which was feeding a fledgling at Aireys Inlet, Victoria, 16 December 2015. Photo: Peter Menkhorst

Figure 5. Immature Pied Currawong subspecies *ashbyi,* Geelong Botanic Gardens, Victoria, 21 April 2012. Photo: Peter Menkhorst

that only adult birds with at least one fully grown rectrix are examined. The clearest sign of a subadult currawong is the tumorous, yellow gape (Figure 5), which seems to be apparent "for at least first 6 months and possibly longer" (Higgins *et al.* 2006, p. 531).

Erroneous identifications

Subspecies *ashbyi* has been confused with the Grey Currawong *Strepera versicolor* from its first description (i.e. Mathews 1913 as *S. v. riordani*) to the present day: for example, see the photograph in Russell & Rowley (2009) (p. 311, right-hand image), which is labelled *S. versicolor* but which we suggest is actually *S. graculina ashbyi*. Further, even professional ornithologists at Museum Victoria have confused these two species—at least four specimens in Museum Victoria that were originally classified as *S. versicolor* have been re-assessed as *S. g. ashbyi* by recent workers (specimens B16532, 16533 and 16536 re-assessed by Richard Schodde; specimen B16531 re-assessed by Jamie Matthew) (as indicated by notations on the specimen labels).

Known distribution and recent records of *Strepera graculina ashbyi*

The presence of a distinctive form of the Pied Currawong in the Geelong–Otway Ranges region has been on record for over a century. Belcher (1914) called these birds 'Otway Foresters', as did Mathews on his specimen label of the type of *riordani*, and Mathews (1930) followed suit. Belcher declared them to be pests in orchards near Aireys Inlet during autumn in the early 1900s. He also reported winter influxes of 'Otway Foresters' to Lorne and Geelong, including to Eastern Park in 1888—a pattern that continues annually to this day (Pescott 1983; PM & CM pers. obs.).

Smith (1971) commented on the lack of white in the tail base of Pied Currawongs at Aireys Inlet. He stated that all Pied Currawongs that he had seen in the Aireys Inlet area over the previous 10 years were of this plumage form. Pescott (1983) also noted this plumage character in Pied Currawongs farther south and west in the Otway Ranges and commented on their winter dispersal into the lowlands around Geelong, the Bellarine Peninsula and the You Yangs.

Over the past 5 years, we have made observations that concur with those published by Belcher (1914), Smith (1971) and Pescott (1983). We have found *ashbyi*-type birds to be by far the most common form in Geelong, where they are now present year-round and breed. Winter flocks can be readily found in gardens including Eastern Park, Geelong (PM & CM pers. obs.), as described by Belcher (1914) and Pescott (1983).

During 2015–2016, PM spent 25 days working in the forest inland from Aireys Inlet and at Cape Otway. Although not the primary purpose of this fieldwork, at every opportunity he took note of the extent of white in the wings and tail base of Pied Currawongs. In all cases (n = ~90 observations), the birds conformed most closely to the *ashbyi* phenotype. *S. g. ashbyi*-type currawongs were particularly common in mixed eucalypt forest in the foothills inland from Aireys Inlet and in remnant Manna Gum *Eucalyptus viminalis* forest at Cape Otway. Between 16 and 18 December 2015, several breeding pairs with fledglings were found along the Aireys Inlet–Bambra Road, and other (perhaps post-breeding) groups of up to 13 individuals could readily be found. In 2016, Adam Fry observed and photographed birds resembling *S. g. ashbyi* at Colac (see Figure 3A), including recently fledged birds, which suggested local breeding. Colac is situated on the boundary of the Otway Plain and Victorian Volcanic Plain, ~45 km inland from the coast.

Habitats in which these observations were made include cool temperate rainforest, moist mixed-species eucalypt forest, Radiata Pine *Pinus radiata* plantation, farmland with remnant patches of eucalypts, small rural townships, coastal resort towns and suburban parks and gardens in two large regional cities (Geelong and Colac).

Mason & Schodde (2006, p. 530) described the distribution of *ashbyi* as "sw. Vic., including The Grampians and adjacent spurs of Great Divide, vagrant to se. SA [South Australia]". We suggest that this distribution is inaccurate, and actually describes the distribution of *nebulosa* at the south-western tail of its range. Continuing in this vein, they went on to describe the distribution of *nebulosa* in western Victoria as west to "central reaches of Murray R., Ballarat and e. Otway Ra., Vic." Again, we question the accuracy of this statement. We contend that *nebulosa*-type birds extend west from the Eastern Highlands through the Central Victorian Uplands and Greater Grampians bioregions (see Figure 6), possibly extending along a forest corridor down the valley of the Glenelg River to the Glenelg Plain bioregion in far south-western Victoria and south-eastern South Australia. However, birds with *ashbyi*-type plumage also occur in far south-western Victoria including the Heywood–Portland area (PM pers. obs.) and Lower Glenelg National Park (Margaret Alcorn pers. comm.). Supporting our biogeographic model is the observation that Pied Currawongs sighted in south-eastern South Australia in recent years resemble *nebulosa* rather than *ashbyi* (R. Green, Mt Gambier, pers. comm.).

South of the Victorian Volcanic Plain, the Otway Ranges, Otway Plain and eastern Warrnambool Plain are occupied by *ashbyi* (Figure 6). The map published by Emison *et al*. (1987) supports this interpretation by indicating the isolation between Pied Currawong populations in the Grampians and far south-west, and those in the Otway Ranges, Otway Plain and eastern Warrnambool Plain, separated by the Victorian Volcanic Plain. Our suggested current distribution for the two subspecies and a possible zone of intergradation are shown in Figure 6.

Information from museum specimens

Specimens in Museum Victoria that have intermediate plumage suggest that intergradation between *ashbyi* and *nebulosa* has occurred in the forests of the Glenelg Plain, and in the Greater Grampians bioregion (Schodde & Mason 1999; Matthew 2006). However, the number of specimens is small, many are immature (Matthew examined 8 adults and 10 first immatures), and the geographic representation of those specimens is limited and patchy—they come mostly from far south-western Victoria where two local ornithologists (Claude Austin at Dartmoor and A.C. Beauglehole at Gorae West) actively collected

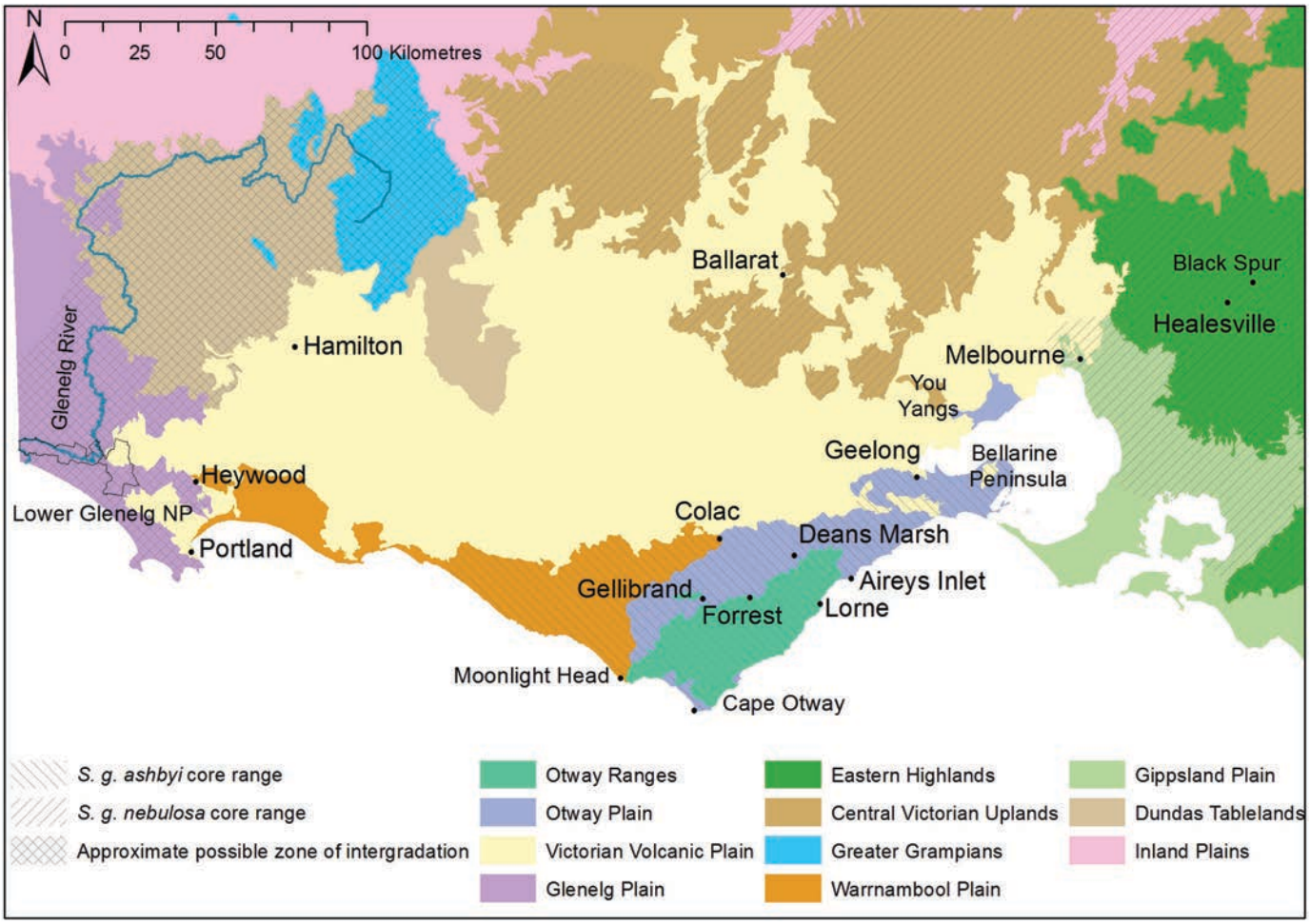

Figure 6. Western Victoria showing the bioregions and localities mentioned, the core ranges of *Strepera graculina ashbyi*, *S. g. nebulosa* and the zone to the north and west of the Victorian Volcanic Plain where intergradation may be occurring. Note: Eastern Highlands and Inland Plains contain multiple bioregions. NP = National Park.

currawong specimens for the National Museum of Victoria during the late 1940s and early 1950s (presumably at the request of then Curator of Birds, W.B. Hitchcock), or from collecting by the CSIRO in the Grampians area in winter 1993. Few specimens from the Otway Ranges or Bellarine Peninsula regions are held in Australian museum collections (Atlas of Living Australia database, accessed 9 February 2015). There are only two specimens from this region in Museum Victoria, a 1905 specimen from Spring Creek (B676) (eastern Otway Ranges), which is clearly *ashbyi*, and a 2000 specimen from Forrest (B23849) (northern Otway Ranges), which is intermediate between the two subspecies.

Evidence for intergradation between *ashbyi* and *nebulosa*

By definition, subspecies can interbreed where they come into contact. Thus, their distinguishing morphological features may intergrade where two subspecies meet or overlap. Schodde & Mason (1999) claimed that extensive intergradation has occurred over much of western Victoria to the extent that subspecies *ashbyi* is threatened with extinction. The evidence for this contention lies in the morphology of specimens collected by Schodde & Mason during a field trip in 1993 and in the interpretation of comments by Ashby (1927) (see below). However, our field observations clearly indicate that the *ashbyi* phenotype is dominant throughout the forests of the Otway Ranges and also in surrounding rural and urban areas. So, although intergradation may have occurred in the Grampians (although evidence for this is not well documented: see below), we have found no evidence of widespread intergradation to the south of the Victorian Volcanic Plain. The situation in far south-western Victoria is not clear, but both *ashbyi*- and *nebulosa*-type birds are reported there.

Biogeography

Schodde & Mason (1999) suggested that subspecies *ashbyi* arose when part of the population of the Pied Currawong was isolated by the formation of the Victorian Volcanic Plain. This plain is a flat to undulating plain stretching west from Melbourne to west of Portland, ~330 km, and is ~160 km north to south at its widest point, covering 2.3 million ha. It is derived from volcanic eruptions over the past 6 million years. Before European settlement, it carried mostly open savanna grassland treed with scattered *Banksia*, *Acacia*, *Allocasuarina* and

Eucalyptus species (S. Sinclair in prep.). Since 1835, it has been steadily converted to sheep pasture of European grasses with windbreaks of exotic trees. In either state, it is likely to have been an inhospitable habitat for forest birds, and hence a potential barrier to their dispersal.

Both Schodde *&* Mason (1999) and Garnett *et al.* (2011) assumed that the Victorian Volcanic Plain acts as a north–south barrier dividing central Victoria from far western Victoria. However, we suggest that the barrier effect of the Victorian Volcanic Plain is stronger in an east–west direction, dividing the Central Victorian Uplands, Greater Grampians and Dundas Tablelands bioregions from coastal western Victoria east of the Glenelg Plain bioregion (Figure 6). This scenario could explain the current and historic distribution of *S. g. ashbyi* confined to forest areas south of the Victorian Volcanic Plain, with *S. g. nebulosa* extending through the Central Victorian Uplands bioregion across the north of the Victorian Volcanic Plain to the Grampians, and possibly south-west through the forests of the Glenelg River.

Conservation status

The process that led to the assigning of a classification of 'Extinct' to *S. g. ashbyi* is a fascinating case of provisional hypotheses that were based on slender evidence becoming progressively more entrenched in the literature and steadily becoming accepted as fact without additional evidence. This process has involved misquoting and misinterpretation of the historical literature. Some of the mistakes could have been avoided through better understanding of Victorian biogeography, and greater involvement of the broader ornithological community in a program of ground-truthing.

The story begins with Schodde *&* Mason (1999): they claimed that *ashbyi* in western Victoria is mixed with *nebulosa*-like populations and that the presence of variable intermediates is suggestive of intergradation in areas of contact and overlap. They then claimed that the extent of intergradation is such that the entire taxon could be threatened with extinction and **provisionally** [our emphasis] suggested that *ashbyi* could be classified as either Data Deficient or Endangered using the IUCN conservation status categories as defined in 1999.

This provisional classification appears to be based on the existence of seven skins (including three immatures) that Schodde *&* Mason (1999) classed as intermediate between *ashbyi* and *nebulosa*; however, no other information is provided regarding the full sample size examined, or the provenance, age, sex or collection registration numbers of skins examined, including the intermediate skins.

In support of the two proposed conservation classifications (Data Deficient or Endangered), Schodde *&* Mason (1999, p. 554) stated:

> Before the middle of the present [i.e. 20th] century, *ashbyi*-like birds were recorded east to the Black Spur – upper Yarra valley, Vic (Amadon 1951). [In fact there is only one record of *ashbyi*-like birds from that region—Ashby's 1901 specimen from 'Black Spur' which became the type specimen for *ashbyi.*] Since then, we have seen no specimens [of *ashbyi*] or intergrades [with *nebulosa*] from east of a line between Ballarat and Cape Otway. This suggests that *ashbyi* is being swamped genetically by *nebulosa*.

Schodde *&* Mason (1999, p. 554) also stated that "such a mélange is present in the Grampians", again without reference to the evidence on which the statement is based. Regardless, the presence of variable intermediates in areas of contact and overlap between subspecies is to be expected—if intergradation did not occur under sympatry or parapatry, then the forms could be regarded as full species.

We suggest that Schodde *&* Mason (1999) erred by not taking adequate account of the small number of specimens available to them and the poor geographical spread of those specimens across the potential range of *ashbyi*. They also took no account of sightings-based evidence from the Otway Ranges (e.g. Smith 1971 and Pescott 1983), instead giving greater import to the Grampians which, as we have already argued, are biogeographically distinct from the core distribution of *ashbyi*.

In *The Action Plan for Australian Birds 2000*, Garnett *&* Crowley (2000, p. 576) listed *ashbyi* as Critically Endangered (C2b), stating:

> This newly-described subspecies [an erroneous statement, it was described in 1913, *nebulosa* was the newly described taxon (1999); perhaps they intended to say 'this newly-circumscribed taxon'] has possibly already been hybridised out of existence. However, until confirmation of this, there is presumed to be a single, very small, decreasing population of pure-bred birds... Almost no information on the taxon exists so it is listed on a precautionary basis.

That is, the presumption of a surviving population was purely precautionary to allow the assigning of a conservation status other than Extinct.

They continued:

> the presence of individuals of intermediate form in the Grampians in 1927 (Ashby, 1927) [the accuracy of this statement is discussed below] and in the Yarra Valley in 1951 (Amadon 1951) [again, an erroneous interpretation—Amadon was referring to the type specimen collected in 1901] suggests that introgression may have been occurring for some time….pure *S. g. ashbyi*, if they exist, are likely to be in south-west Victoria but there have been no searches.

A decade later, in *The Action Plan for Australian Birds 2010*, Garnett *et al*. (2011) had abandoned their precautionary stance and classified the taxon as 'Extinct', but gave no explanation. Indeed they not only accepted the hybridisation hypothesis in full, but pushed the timing of the process further back. Under the heading 'Reasons for listing', Garnett *et al*. (2011, p. 385) stated:

> Probably extinct before 1900; even when described [1913] only hybrids seem to have been present [meaning that the type specimen is a hybrid, in which case the taxon has never been valid].

Under the heading 'Former range', they stated:

> However, blacker birds, with more extensive white than is thought to have been characteristic of pure *S. g. ashbyi*, were already present within its former range in 1925 (Ashby 1927) [we can find no such statement or implication in Ashby 1927 (see below)].

Under the heading 'Reasons for extinction', they stated:

> This subspecies is believed to have been hybridised out of existence by the more widespread *S. g. nebulosa.* While uniformly slate-grey individuals with vestigial white in the wings do still occur in western Vic, so do blacker birds with much more white as well as intermediate forms so that no distinct subpopulation can be identified [no supporting evidence is provided for this statement].

Our reading of Ashby (1927) and Amadon (1951) reveals no hint of either author providing evidence for, or claiming the presence of, 'intermediate forms'. Ashby (1927, p. 291) stated that the three specimens that he collected in the Grampians in 1925 were 'alike' and were:

> **widely different** [our emphasis] from specimens I have collected at Black Spur, in Victoria [the type locality of *ashbyi*, but *nebulosa* is unquestionably the dominant subspecies there (PM & CM pers. obs.)], Woodford in the Blue Mts (N.S.W.) [based on the map in Schodde & Mason (1999), Woodford lies within the intergrade zone between subspecies *nebulosa* and *graculina*] and at Torrington, in the N.S.W. highlands near the Queensland border [subspecies *graculina*].

There is nothing here to suggest intermediate forms in the Grampians in 1925; in fact the opposite conclusion could be drawn—Ashby's Grampians specimens were morphologically similar to each other and uniformly different from those farther east and north. Further, he considered them to be similar to *riordani* (now subsumed into *ashbyi*); that is, they were uniformly similar to *ashbyi*, not intermediate between it and *graculina* (the only other taxon recognised from Victoria at that time).

Amadon (1951) made no comment on intergradation, referring only to the type specimen but quoting Ashby (1927) on the presence of *graculina*-like birds at Black Spur. Amadon (p. 26) recognised that the type locality "is in a borderline area where, if Ashby is correct [in noting the presence of *graculina*-like birds at Black Spur], many of the individuals may resemble *graculina*". That is, Amadon's comments about variation in plumage are a comparison between the two forms then recognised (*ashbyi* and *graculina)*; and indicate that he noted something odd about the type specimen of *ashbyi*. There is no stated or implied suggestion of intergradation between *ashbyi* and *graculina*.

We therefore suggest that the claims that intermediate forms existed in the Grampians in 1925 and at Black Spur in 1951 [actually 1901] are based on misinterpretations of the literature. The only suggestion of intergradation between *nebulosa* and *ashbyi* is that of Schodde *&* Mason (1999). Thus, the primary argument for intergradation and genetic swamping of *ashbyi* by *nebulosa* is of recent (1990s) origin, and is based on brief statements which are lacking in supporting evidence, such as details of the specimens examined. These statements have been uncritically accepted and embellished, then used as the basis for declaring the taxon to be extinct.

Validity of the type specimen of *Strepera graculina ashbyi*

The type specimen was described as being smaller and paler than the nominate subspecies (Mathews 1913), but because it is an immature female (Figure 1; Amadon 1951) that is to be expected. Further, the type locality is clearly within the distributional range of *nebulosa* and outside that of *ashbyi* (see below). R. Schodde (*in litt*. to PM 29 June 2016) stated that the type specimen "looks the same as unpatterned west Victorian birds, so there is no phenotypic problem with type specimen identity under the Code of Zoological Nomenclature". Although that may be true as a strict interpretation of the Code, we conclude that the width of white at the bases of the rectrices and the extent of white in the primaries (Figure 1) is closer to *nebulosa* than to *ashbyi*. This, combined with the type locality, suggests that the holotype is a better fit for *nebulosa* and is not representative of *ashbyi*. Therefore, we suggest that designation of a neotype is warranted. We further suggest that the type specimen of *riordani* is clearly *ashbyi* (white bases to rectrices completely obscured by the uppertail-coverts, very small white speculum: Figure 2) and a better fit to be the type specimen of *ashbyi*.

Discussion

Distribution and biogeography

Our observations indicate that the *ashbyi* phenotype is dominant throughout the Otway Ranges (roughly from Aireys Inlet to Moonlight Head and inland to Deans Marsh, Forrest and Gellibrand River townships) and extends onto the Otway Plain and eastern Warrnambool Plain during the non-breeding period at least. This non-breeding distribution extends across the entire Otway Plain to Colac, which lies at the boundary of three bioregions, the Otway Plain, Warrnambool Plain and Victorian Volcanic Plain (Figure 6). These observations are at odds with the hypothesis that *ashbyi* has been hybridised out of existence; indeed, they suggest that the taxon is a stable entity within at least the Otway Ranges and Otway Plain bioregions. We further suggest that the core breeding distribution of *ashbyi* is the Otway Ranges. There is winter dispersal out of these coastal forests into semi-cleared country and urban areas around the periphery of the core distribution. In recent decades, winter dispersers have begun to permanently colonise and breed in urban habitats in Geelong (PM & CM pers. obs.) and Colac (Adam Fry pers. comm.), mimicking the recent colonisation of Melbourne by *nebulosa* (Loyn *&* Menkhorst 2011). Trevor Pescott (pers. comm.) suggested that *ashbyi* first occupied Geelong year-round following the intense 'Ash Wednesday' bushfires in the eastern Otway Ranges in February 1983.

The assumption that the birds collected in the Grampians by Ashby in 1925 represent *ashbyi* is actually based on rather unconvincing evidence and a failure to give adequate attention to age and sex variation in plumage colour and pattern. Indeed, we consider the historical occurrence of *ashbyi* in the Grampians to be unproven—Ashby's specimens, which cannot be located, were brown-breasted females (Ashby 1927; Schodde *&* Mason 1999), and without examination are unable to be assigned to a subspecies from the descriptions provided. Ashby (1927) did not address the distinguishing features of *ashbyi* when describing the specimens that he collected. That is, he did not mention the extent of white in rectrices or remiges. However, specimens collected by CSIRO in winter in 1993 indicate considerable variation in plumage characters in the Grampians region (Schodde *&* Mason 1999), which

may indicate intergradation between *nebulosa* and *ashbyi*-like birds.

In south-western Victoria, for example in the Heywood region, some Pied Currawongs more closely resemble *nebulosa* (PM pers. obs.) but *ashbyi*-like individuals also occur (PM & Margaret Alcorn pers. obs.).

A small proportion of birds observed in Geelong and the Bellarine Peninsula during autumn and winter more closely resembled *nebulosa* (that is, showed a broader white band across the base of the uppertail and greater extent of white on the primaries than would be expected for *ashbyi*). We suggest that these birds may be winter visitors from the core *nebulosa* population to the north-east in the Eastern Highlands bioregions, or the Melbourne suburbs, which disperses widely across lowland Victoria during the autumn and winter months (Emison *et al*. 1987). This hypothesis requires the recognition that the Victorian Volcanic Plain is not an impermeable barrier to Pied Currawongs. It is possible that habitat changes since European occupation of the Victorian Volcanic Plain, such as the planting of windbreaks and, in recent decades, extensive commercial eucalypt plantations, have reduced the barrier effect of the Victorian Volcanic Plain, allowing some seasonal occupation of the area by *nebulosa.* It is also possible that birds from the *nebulosa* population now inhabiting Melbourne can cross Port Phillip from the Mornington Peninsula to the Bellarine Peninsula. Given that the entrance to Port Phillip is <2 km wide, this seems entirely plausible.

The Otway Ranges are biogeographically important, both for their endemic taxa and for the wet-forest species that are lacking (such as the Superb Lyrebird *Menura novaehollandiae*, Red-browed Treecreeper *Climacteris erythrops*, Pilotbird *Pycnoptilus floccosus* and Eastern Whipbird *Psophodes olivaceus*). One other bird subspecies is endemic to the Otway Ranges region, the Rufous Bristlebird *Dasyornis broadbenti caryochrous*. Three other subspecies are endemic to the Otway Ranges plus South Gippsland—Brown-headed Honeyeater *Melithreptus brevirostris wombeyi*, White-browed Scrubwren *Sericornis frontalis harterti* and Olive Whistler *Pachycephala olivacea bathychroa* (Schodde *&* Mason 1999).

The nexus between taxonomy and conservation

Given that, in Australia, subspecies are recognised under State/Territory and Commonwealth environment legislation, and are often the focus of conservation programs (e.g. the Helmeted Honeyeater *Lichenostomus melanops cassidix*), it is important to ensure that subspecies are clearly defined and accurately reflect the biological reality. In current ornithology, a subspecies is typically defined as a breeding population that occupies a distinct segment of the geographical range of its species and is measurably distinct in phenotype or genotype, or both (James 2010; Tobias *et al*. 2010). However, the circumscription of parapatric subspecies on morphological grounds alone is problematic because some morphological characters may reflect environmental variation rather than genetics (i.e. evidence of heritability may be lacking), and because birds with intermediate phenotypic characters are likely to occupy a zone of intergradation between the two subspecies.

In the case of *S. g. ashbyi*, we suggest that estimation of conservation status has been clouded by a lack of field survey, small numbers and limited geographical coverage of available museum specimens, and poor understanding of the biogeography of the Pied Currawong in the western half of Victoria, compounded by inadequate recognition of the effects of age and moult. We suggest that the core breeding distribution of *ashbyi* is the Otway Ranges and that the taxon is common and distinctive within that region, with little variation in the key phenotypic characters and no obvious evidence of intergradation with *nebulosa*. In forests farther west in Victoria, a larger proportion of Pied Currawongs more closely resemble *nebulosa*, and this may represent a zone of intergradation between the two forms. Whether or not that intergradation represents a threat to the continuing existence to *ashbyi* is unknown.

Conclusions

The arguments put forward to justify the classification of *S. g. ashbyi* as Extinct do not stand up to close scrutiny. We suggest that there are two possible conservation statuses for *S. g. ashbyi*:

1. It is simply the end-point in a north–south cline of reducing white in the remiges and rectrices, without an obvious ‘step’ in the phenotypic variation. In this case it would not qualify as a separate taxon at any level and would not warrant a conservation status assessment under current policies or legislation.
2. It is a valid subspecies whose core breeding population occurs in the forests of the Otway Ranges and was separated from other breeding populations of the Pied Currawong to the north by the savanna grassland of the Victorian Volcanic Plain.

This conundrum can be finally resolved only by comprehensive genetic studies to determine patterns of phylogeographic structure within the Pied Currawong across its entire distribution. Until these studies are conducted, a conservation status of Extinct seems unwarranted, given the dominance of the *ashbyi* phenotype in the Otway Ranges. Indeed, we suggest that the appropriate IUCN conservation category is Least Concern.

We also find that the type locality of *ashbyi* is inexplicably anomalous and that the holotype (AMNH 673622) is an inadequate representative of the *ashbyi* phenotype, more probably being an immature female *nebulosa*. We suggest that a neotype from the Otway Ranges should be formally allocated.

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References

Amadon, D. (1951). Taxonomic notes on the Australian butcher-birds (Family Cracticidae). *American Museum Novitates* **1504**, 1–33.

Ashby, E. (1927). The Grampians Range of Victoria and its bird life. *Emu* **26**, 285–292.

Belcher, C.F. (1914). *The Birds of the District of Geelong, Australia*. Griffiths, Geelong, Vic.

BirdLife Australia (2016). Working List of Australian Birds v. 2. BirdLife Australia, Melbourne. Available online: http://www.birdlife.org.au/conservation/science/taxonomy (retrieved 16 October 2016).

Commonwealth of Australia (2015). *Strepera graculina ashbyi*—Pied Currawong (western Victoria) SPRAT Profile. Available online: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=67112 (retrieved 20 October 2016).

DEWNR (Department of Environment, Water and Natural Resources) (2014). *Census of South Australian Vertebrates.* Department of Environment, Water & Natural Resources, Adelaide.

DSE (Department of Sustainability and Environment) (2013). *Advisory List of Threatened Vertebrates in Victoria*. Department of Sustainability & Environment, Melbourne.

Emison, W.B., Beardsell, C.M., Norman, F.I. & Loyn, R.H. (1987). *Atlas of Victorian Birds*. Department of Conservation, Forests & Lands and Royal Australasian Ornithologists Union, Melbourne.

Garnett, S.T. & Crowley, G.M. (2000). *The Action Plan for Australian Birds 2000*. Environment Australia, Canberra.

Garnett, S.T., Szabo, J.K. & Dutson, G. (2011). *The Action Plan for Australian Birds 2010*. CSIRO Publishing, Melbourne.

Higgins, P.J., Peter, J.M. & Cowling, S.J. (Eds) (2006). *Handbook of Australian, New Zealand & Antarctic Birds, Volume 7A: Boatbill to Larks.* Oxford University Press, Melbourne.

James, F.C. (2010). Avian subspecies. *Ornithological Monographs* **67**, 1–5.

Loyn, R.H. & Menkhorst, P.W. (2011). The bird fauna of Melbourne: Changes over a century of urban growth and climate change, using a benchmark from Keartland (1900). *Victorian Naturalist* **128**, 210–231.

Mason, I.J. & Schodde, R. (2006). *Strepera graculina* Pied Currawong subspecies summaries. In: Higgins, P.J., Peter, J.M. & Cowling, S.J. (Eds). *Handbook of Australian, New Zealand & Antarctic Birds, Volume 7A: Boatbill to Larks*, p. 530. Oxford University Press, Melbourne.

Mathews, G.M. (1913). New species and subspecies of Australian birds. *Austral Avian Record* **2** (4), 78.

Mathews, G.M. (1930). *Systema Avium Australasianarum. A Systematic List of the Birds of the Australasian Region, Part II.* British Ornithologists' Union, London.

Matthew, J. (2006). Pied Currawong geographical variation. In: Higgins, P.J., Peter, J.M. & Cowling, S.J. (Eds). *Handbook of Australian, New Zealand & Antarctic Birds, Volume 7A: Boatbill to Larks*, pp. 552–553. Oxford University Press, Melbourne.

Pescott, T. (1983). *Birds of Geelong*. Neptune Press, Geelong, Vic.

RAOU (Royal Australasian Ornithologists Union Checklist Committee) (1926). *Official Checklist of the Birds of Australia*. 2nd edn. Royal Australasian Ornithologists Union, Melbourne.

Russell, E.M. & Rowley, I.C.R. (2009). Family Cracticidae (butcherbirds). In: del Hoyo, J., Elliott, A. & Christie, D.A. (Eds). *Handbook of the Birds of the World, Volume 14: Bush-shrikes to Old World Sparrows,* pp. 308–335. Lynx Edicions, Barcelona, Spain.

Schodde, R. & Mason, I.J. (1999). *The Directory of Australian Birds: A Taxonomic and Zoogeographic Atlas of the Biodiversity of Birds in Australia and its Territories*, *Volume 1: Passerines*. CSIRO Publishing, Melbourne.

Smith, F.T.H. (1971). A currawong problem. *Bird Observer* **478**, 5–6.

Tobias, J.A., Seddon, N., Spottiswood, C.N., Pilgrim, J.D., Fishpool, L.D.C. & Collar, N.J. (2010). Quantitative criteria for species delimitation. *Ibis* **152**, 724–746.

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