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Standardising English names for Australian bird subspecies as a conservation tool

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Summary

Over the last 25 years subspecies have become an important unit of bird conservation in Australia. Some have evocative common English names which have allowed the subspecies to be vested with meaning among conservation advocates, evoking feelings of concern, loyalty and affection. This suggests that providing subspecies with stable English names can allow development of a 'brand' among those in need of conservation action. Also, since scientific names often change with knowledge of taxonomic relationships among birds, a stable list of standardised English names for all species and subspecies can minimise confusion and ambiguity among the public and in legislation. Here we present the arguments for creating a standardised list of English names for Australian bird subspecies and set out principles for formulating subspecies names, along with a list of the names themselves, with the aim of building the general public's attachment to subspecies, increasing interest in their conservation and as subjects of research.

Introduction

Naming has long been recognised as fundamental to understanding diversity (Wright 2014). Names not only carry information about the entities being named but also about the society creating those names (Carlson *et al.* 2014) – the language available to describe objects can influence the relationship and understanding of those objects (Evans and Levinson 2009), affecting emotional responses (Perlovsky 2009) and a capacity to remember them (Pavlenko 2003). Also, the diversity of names in common usage about a class of objects or ideas, which can vary over time (Berger 1980), is an expression of their relevance to the society using them (Sealey and Charles 2013).

Among the first things children do when they start to relate to nature is pointing and naming (Milstein 2011) and all human societies have a diverse range of names for the categories into which they place animals and plants (Brown 1984), as well as many systems of categorisation (Ritvo 1997). Formal scientific naming, using the binomial system initiated by Carl Linnaeus in 1753 with publication of *Species Plantarum* (Linnaeus 1753), is governed by a set of rules administered by the International Commission on Zoological Nomenclature for animals and the International Code of Nomenclature for Algae, Fungi, and Plants. However, with some exceptions (micro-organisms and many plants), use of scientific names is generally confined to an educated elite. Instead most people know organisms by a vernacular name (Caramaschi *et al.* 2005, sometimes called 'common' names but see Crother 2007) in the language they are most familiar with; in the case of Australia, English.

Words used by the general population specifically to denote birds are more diverse than for any group except mammals (Sealey and Charles 2013) and individual species can have many vernacular names, both within and between languages (Stevens *et al.* 2014). Such names can have a long and rich cultural history (for Australia see Fraser and Gray 2013) and transcend the fields of ornithology and birdwatching into wider society. Vernacular names for birds are often used for sporting teams,

popular culture, business or common speech. Vernacular names for birds are also used in all major field guides, as well as official conservation programs and educational materials.

However, while the social importance of bird names is wide-ranging, some fields, such as conservation, education, and environmental awareness activities, benefit from species having a set of vernacular names that is standardised. In North America, for instance, reptiles and amphibians have had a set of standard English names since 1956 (Collins and McTaggart 2009). For Australian bird species, the naming conventions developed by the (then) Royal Australasian Ornithologists Union (RAOU) have been in existence since 1978 (Schodde *et al.* 1978). Names for Australian bird species have remained largely stable (at least within Australia) since then, under the auspices of the BirdLife Australia English Names Committee (and earlier incarnations) and in major Australian taxonomic lists (Christidis and Boles 1994, 2008). The only significant change to Australian bird names since 1978 came in the mid-1990s when RAOU members were asked to vote on a selection of (contentious) names (Higgins 1995). However, while the long and highly successful history of providing stable, intuitive names for birds has been true for species, it has not previously been applied systematically to subspecies in Australia.

Subspecies are important units of avian biodiversity

Subspecies are acknowledged as significant units of biodiversity. In an evolutionary sense, subspecies can represent incipient speciation (Mayr 1942, Winkler 2010, Weir 2014). In large, environmentally, and climatically diverse countries like Australia and the USA, subspecies often possess important local adaptations that help birds survive in unique environments (Winkler 2010). Internationally, subspecies are formally recognised under the Convention on Biological Diversity and in almost all national threatened species legislation (Haig *et al.* 2006, Garnett and Christidis 2007). While the IUCN Red List does not include subspecies, the Red List categories and criteria are as applicable to subspecies as species.

In Australia, bird subspecies were listed systematically as early as 1912 (Mathews 1912) and the majority of the Australian avifauna was again catalogued in the late 1990s (Schodde and Mason 1997, 1999). Australian subspecies are strongly regionally partitioned, and local forms are often the ones with which people most strongly identify. The "dawn chorus" can vary noticeably across the continent due to differences in subspecies calls. Some subspecies even have public identities that exceed those of their parent species. Perhaps the best known example is the Helmeted Honeyeater *Lichenostomus melanops cassidix*, a subspecies of the Yellow-tufted Honeyeater that became the official bird of Victoria over 70 years ago and has since received millions of dollars in conservation investment. It was because there was already substantial attention on subspecies, such as the Helmeted Honeyeater, that the first national action plan for the conservation of Australian birds (Garnett 1992) considered the status of subspecies as well as all species (Garnett 1993).

The need for vernacular names for subspecies

The name of an animal can have a significant effect on its conservation appeal (Karaffa *et al.* 2012) and the presence of a vernacular name can be critical to conservation (e.g. Stubbs and Shardlow 2012, Lunney 2014). Standardised vernacular names for subspecies are already in use in countries such as New Zealand (Miskelly *et al.* 2008, Robertson *et al.* 2012) and the USA where vernacular names are applied to Federally-listed endangered subspecies (US Fish and Wildlife Service 2015) and to most others in field guides (e.g. Sibley 2011). Vernacular names have also been applied to subspecies in other groups of fauna in various parts of the world (e.g. primates in Africa, Grubb 2006; bats in Australia, Armstrong and Reardon 2006).

In Australia, the creation of standard English names for bird subspecies was rejected in 1978 on the basis that it would lead to misidentification, as few can be distinguished reliably in the field (Schodde *et al.* 1978). At that time, however, there was little concern for the

conservation of subspecies. Fifteen years later, Garnett (1993) suggested that such a list was needed, at least for threatened taxa given the existing level of support for some subspecies, as a means to engender public support for the conservation of all subspecies. At that time, the idea was deemed too novel and it was feared that new names would distract from important conservation messages. Instead, subspecies were identified in the first Action Plan for Australian Birds (Garnett 1992) by the vernacular name of the species with a subspecific identifier (usually geographic) in brackets – for example 'Red-tailed Black-Cockatoo (south-eastern)' for *Calyptorhynchus banksii graptogyne* and 'Yellow Chat (Alligator Rivers)' for *Epthianura crocea tunneyi*. This practice was continued in the 2000 and 2010 Action Plans for Australian Birds (Garnett and Crowley 2000, Garnett *et al.* 2011). This naming approach was largely taken up by the Australian Government in listing subspecies under the *Environment Protection and Biodiversity Conservation Act 1999* and adopted in recovery plans for many taxa (e.g. 'National Recovery Plan for the Regent Parrot (eastern subspecies) *Polytelis anthopeplus monarchoides*'; Baker-Gabb and Hurley 2011). Alternatively, reference to the subspecies was spelt out at length in Recovery Plan titles (e.g. 'National recovery plan for the white-bellied subspecies of the Crimson Finch *Neochmia phaeton evangelinae* and the Cape York Peninsula subspecies of the Star Finch *Neochmia ruficauda clarescens*'; Dorricott and Garnett 2006).

However, the way in which English names are presented has been slowly evolving to place the regional descriptor ahead of the species vernacular name (e.g. Capricorn Yellow Chat; Houston *et al.* 2013), including in legal documents – for example, in the National Recovery Plans for the South-eastern Red-tailed Black-Cockatoo (Commonwealth of Australia 2007), Christmas Island Goshawk *Accipiter fasciatus natalis* (Hill 2004), and Norfolk Island Green Parrot *Cyanoramphus novaezelandiae cookii* (Hill 2002). Five of the 12 bird taxa identified in the 2015 national *Threatened Species Strategy* as needing special treatment are subspecies, with English names expressed in this manner: Norfolk Island Boobook *Ninox novaeseelandiae undulata*, Norfolk Island Green Parrot, Western Ground Parrot *Pezoporus wallicus flaviventris*, Alligator Rivers Yellow Chat, and Helmeted Honeyeater (Australian Government 2015). Popular field guides also apply 'proper' English names to many distinctive subspecies (e.g. Morcombe 2004, Simpson and Day 2010), while significant educational materials have also been produced using subspecies vernacular names, particularly for threatened subspecies (e.g. Friends of the Helmeted Honeyeater; www.helmetedhoneyeater.org.au).

Standard English names and taxonomy

Whereas taxonomic lists used to be updated relatively infrequently – official bird lists for Australia have been produced in 1913 (RAOU 1913), 1926 (RAOU 1926), 1969 (CSIRO 1969), 1994 (Christides and Boles 1994), 2008 (Christides and Boles 2008) and 2013 (BirdLife Australia 2016) – some major ornithological lists are now being updated several times each year (e.g. http://www.worldbirdnames.org/updates/update-diary/). Add to this the differences in species concepts used in different lists today, BirdLife International: Biological Species Concept based on phenotypic characters (BirdLife International – http://www.birdlife.org/datazone/info/taxonomy, Tobias *et al.* 2010); Howard and Moore: Biological Species Concept with genetic evidence accepted (Dickinson *et al.* 2013); the Clements *et al.* (2012) Checklist: Biological Species Concept (http://www.birds.cornell.edu/clementschecklist/about/methods/); International Ornithological Congress: publicly unspecified (http://www.worldbirdnames.org), and it is clear that differences in taxonomic classification lists are only going to grow over time. Some taxa have moved repeatedly between species and subspecies classifications depending on the definition of species accepted at the time. For instance, Western Ground Parrots have been described as a species (North 1911), a subspecies (Matthews 1912), a species (Murphy *et al.* 2010) and a subspecies (BirdLife International 2012). Ford (1969) even questioned the validity of separating the mainland populations of Ground Parrots at the subspecies level based on morphometric analyses of Ground Parrot specimens across its range. As Garnett and Christidis (2007) have noted, such taxonomic uncertainty does

not affect conservation for birds in Australia in any legislative sense. Western Ground Parrots have been listed as critically endangered since the 1990s and protected under Western Australian legislation (with a recovery plan – as a subspecies). Nonetheless, the taxonomic uncertainty for Western Ground Parrots has caused significant concern about conservation prioritisation for this critically endangered bird (Murphy *et al.* 2010, Friends of the Western Ground Parrot pers. comm.). The Norfolk Island Green Parrot has had a similar history (Boon *et al.* 2001, Christidis and Boles 2008, Gill and Donsker 2015, Collar and Christie 2016).

A stable, comprehensive and socially acceptable set of names for birds, across taxonomic rank (species and subspecies), can overcome much of the concern about taxonomic uncertainty. The standard English name need not change regardless of whether a taxon is assigned two or three Latin names. Evidence for this comes from the Black-eared Miner. Long considered a species *Manorina melanotis* in Victoria, and listed as such in state legislation, the same bird has always been listed as a subspecies of the Yellow-throated Miner *Manorina flavigula melanotis* – under the vernacular name Black-eared Miner – in South Australia. Regardless of the taxonomy, the name Black-eared Miner has been retained throughout and conservation effort has been sustained in both Victoria and South Australia.

Subspecies or species for data collection

Systematic allocation of subspecies names can formalise something that is already being done informally or, in the case of legislative instruments such as recovery plans, being done formally but not systematically, with a view to establishing effective conservation identities with which the public can more readily identify and form an attachment to. Schodde *et al.* (1978) posited that identifying and recording subspecies in the field is an unnecessary encumbrance, unless they are readily identifiable, an approach also taken by Sibley (2011). The difficulty of identifying most subspecies in the field, particularly in zones of introgression where several subspecies or hybrids potentially co-occur, was the main reason the RAOU English Names Committee did not to assign English names to subspecies in 1978.

However, the way in which subspecies are valued in Australia has changed since 1978. In the 1970s and 1980s, little attention was directed towards subspecies. Schodde *et al.* (1978: 250) noted that "Ornithological research, other than taxonomic, and foresters, ecologists and faunal officers who use names of birds are all concerned with birds at the level of species". Today the context is fundamentally different. Subspecies are equal under the law in Australian jurisdictions (Garnett and Christidis 2007) and can attract substantial funds for their conservation. Indeed, many ornithologists and ecologists today have careers dedicated to the recovery of certain subspecies. So while a comprehensive listing of all bird species and subspecies is advantageous largely for conservation reasons, it is also advantageous for ornithological research in a growing number of situations. For example, a recent adaptation plan for Australian birds modelled current and future climate suitability at a subspecies level and revealed many more parts of Australia where climates are likely to become less suitable than would have been apparent from modelling species alone (Garnett and Franklin 2014). Furthermore, the skills of birdwatchers, improvements in equipment for the observation and recording of birds and better habitat and distribution information means that many more subspecies can now be identified accurately in the field than was the case in 1978. Indeed, some birdwatchers are starting to make lists of the subspecies they record (R. Clarke pers. comm.).

For practical reasons however, and even with greater recognition of bird subspecies, the primary taxonomic unit for field data collection in general should continue to be species. Subspecies classifications can be attributed to primary bird data post-hoc through spatial intersections with known spatial ranges of taxa (point in polygons analyses) and this will usually yield sufficient information on subspecies to facilitate research and conservation (Garnett and Franklin 2014). In some instances, subspecies classifications are now attributed in real time (using spatial range polygons) as data are submitted (Birdata 2016).

Determining standard English names for subspecies of Australian birds

In 2013, BirdLife Australia developed a 'working' list of bird species and subspecies occurring in Australia and its territories (BirdLife Australia 2016), as the previous list by Christidis and Boles (2008) was becoming outdated with new vagrants arriving in Australia and changing taxonomy (minor updates to the BirdLife Australia list have occurred since 2013, but the approach and procedures regarding subspecies name allocation remain the same). The BirdLife Australia list included, for the first time in over 100 years, a list of all subspecies known to occur in Australia and, for the first time, vernacular English names for both species and subspecies. Here we describe the process of assigning vernacular names to subspecies used in BirdLife Australia (2016), discuss some of the challenges and suggest processes for refinement in the future. Details of the taxonomic approach used to generate the list are described in BirdLife Australia (2016), and the English and scientific names for species and subspecies are provided in Table S1 in the online supplelmentary material.

Bird names are generally comprised of a term indicating the type of bird (e.g. Penguin, Parrot, Wagtail etc.) and a descriptive epithet characterising the species which prefixes the bird type (e.g. Short-tailed, Australian, Great, Wandering) – although there are exceptions to this (e.g. single word names such as Emu). In the Australian bird list (BirdLife Australia 2016), descriptive epithets for birds (i.e. the first word or term in the name) are comprised of words describing colour (e.g. Scarlet Robin, Scarlet-chested Parrot), geography (e.g. Eyrean Grasswren, Western Bristlebird, Australasian Gannet), morphology (e.g. Greater Sand Plover, Tooth-billed Bowerbird, King Penguin), habitat (e.g. Spinifex Pigeon, Mangrove Robin, Sandstone Shrike-thrush), behaviour (Shy Heathwren, Wandering Albatross), voice (Whistling Kite, Noisy Scrub-bird), people (i.e. eponymous names, e.g. Gilbert's Whistler) and abundance (i.e. the word 'common', e.g. Common Bronzewing). Colour-based epithets are most common for species comprising around half of names (Table 1). Geographic epithets are also common and are applied to around 20% of Australian bird species, with morphological epithets used for 11.0% of species. Habitat-based epithets are used for 5.5% of names and the rate of eponymous epithets is similar at 5.6%. Behaviour- and voice-based names are less common components of the Australian bird species list with 1.7% and 2.4% bird species names, respectively. The term 'Common' is used for 18 bird species (Tables 1 and S1). A similar general approach and mix of epithet types can be applied to naming subspecies, although with some specific considerations.

General principles

Applying strict rules for bird English names is notoriously difficult (Schodde *et al.* 1978). Therefore, principles, which allow for case-by-case considerations, but which maximise consistency and thus usability, are generally most appropriate (e.g. Schodde *et al.* 1978, Gill and Donsker 2015). In Australia, principles for species English names are set out in Schodde *et al.* (1978) and these have been applied in Australian bird lists since then, including BirdLife Australia (2016). These general nomenclatural principles are followed and for subspecies the following additional principles were applied:

- General convention (e.g. hyphenation and group names) should be consistent and should follow the conventions used for species names on a list.
- Names must be unique – subspecies names should not overlap with species names or other subspecies names on a list and species names have precedence.
- Names should be as concise as possible, however brevity should not compromise accuracy or introduce ambiguity.
- Names should provide some useful characterisation of the bird in the phenotype, geography, abundance or habitat preference.
- Precedence should prevail, especially where names are in usage locally.
- Names should take into account potential taxonomic change in order to maximise stability, i.e. the epithets applied to subspecies should be sensible regardless of taxonomic classification (see 'Standard English names and taxonomy').

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Table 1. Percentage of different name epithet types which are applied to Australian bird species and subspecies (numbers in parentheses).

Epithet type	Species	Subspecies	Subspecies names in group
Geographic	19.7% (181)	92.8 (977)	Numerous – see full listing for details
Colour	48.1% (442)	2.0% (21)	Red Boobook, Yellow-vented Blue Bonnet, Red-vented Blue Bonnet, Pallid Blue Bonnet, Yellow Rosella, Golden-mantled Rosella, Purple-backed Fairy-wren, Rusty Grasswren, Golden-backed Honeyeater, Yellow-rumped Pardalote, Red-breasted Babbler, Orange-winged Sittella, White-headed Sittella, White-winged Sittella, Black-capped Sittella, Striated Sittella, Yellow Figbird, Green Figbird, Silver-backed Butcherbird, White-bellied Crimson Finch, Black-bellied Crimson Finch
Morphological	11.0% (101)	0.2% (2)	Plumed Frogmouth, Helmeted Honeyeater
Eponymous	5.6% (51)	0.7% (7)	Gould's Bronze-Cuckoo, Gibson's Albatross, Butler's Corella, Muir's Corella, Macleay's Fig-Parrot, Marshall's Fig-Parrot, Gilbert's Honeyeater
Habitat	5.5% (48)	0.9% (10)	Forest Red-tailed Black-Cockatoo, Mallee Ringneck, Sandhill Striated Grasswren, Mallee Striated Grasswren, Eastern Woodlands Western Gerygone, Desert Western Gerygone, Upland Pilotbird, Lowland Pilotbird, Mallee Western Whipbird, Paperbark Flycatcher
Abundance	2.0% (18)	0.2% (2)	Common Rock Dove, Common Eastern Reef Egret
Behaviour	1.7% (16)	0	
Voice	2.4% (22)	0	
Other*	4.2% (39)	0	
Unidentified subspecies	0	3.2% (34)	Various vagrant taxa

*Other refers to single word species names (e.g. Ostrich, Brolga, Galah), where names cannot easily be categorised (e.g. Willie Wagtail, Musk Lorikeet) or where the meaning of the word is unclear (e.g. Mew Gull).

In developing English names for Australian bird subspecies, two broad types of name emerged: 1) names based on geography and 2) names based on phenotypical or habitat characteristics. The latter are generally shorter and usually do not include the name of the species (e.g. Golden-backed Honeyeater – a subspecies of Black-chinned Honeyeater), while the former are generally derived by adding a geographic epithet to the species name, usually as a prefix (e.g. Tasmanian Eastern Spinebill, Houtman Abrolhos Lesser Noddy) and are thus generally longer (Tables 1 and S1).

Names with precedence

Given the level of taxonomic change over time, many birds currently listed as subspecies have been described as species in the past. In North America, over 300 bird subspecies listed as of 1982 were at one point in history classified as species (Mayr 1982). A similar situation exists in Australia and in these cases bird subspecies (as listed now) have often been allocated vernacular names on previous bird lists, in literature or have some significant vernacular precedence (e.g. among aviculturalists). Where this is the case those names are applied to subspecies in preference to alternative epithets under the rationale that local communities are often already emotionally and sometimes financially invested in existing names. For the initial listing of subspecies names presented here, 29 subspecies (2.8% of 1,053 subspecies recognised) are listed based on

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well-established English names. Some of these names arise from avicultural circles (e.g. Golden-mantled Rosella for the subspecies of Eastern Rosella *Platycercus eximius elecica* occurring in north-eastern New South Wales and south-eastern Queensland, Black-bellied and White-bellied Crimson Finches *Neochmia p. phaeton* and *N. p. evangelinae*), while others originate from a time when the subspecies were considered to be distinct species.

Geographic epithets

Most Australian bird subspecies have lacked a widely accepted English name. For these there was a choice between names based on the often subtle differences in phenotypic characters (usually morphology or vocalisation) used to distinguish subspecies (Wilson and Brown 1953, Martin and Tewksbury 2008, Winkler 2010) or their geographic distribution. Given the difficulty in describing morphological or chromatic differences between many subspecies, the majority of subspecies names (92.8%) are based on geography. This is a significantly higher proportion than is evident for species names and reflects the fact that the most distinctive feature of most subspecies is their distribution – i.e. subspecies are usually allopatric or parapatric, at least when breeding (however see section 'Phenotypic epithets' below). Geographic epithets are often used in the English names of subspecies in New Zealand (e.g. Robertson *et al.* 2012) and the USA (e.g. Sibley 2011) and this practice is routinely applied to species in Australia – e.g. Eastern and Western Yellow Robin (once considered the same species – Yellow Robin) and internationally – Atlantic and Indian Yellow-nosed Albatross (formerly considered a single species – Yellow-nosed Albatross).

Geographic epithets for most threatened species were derived by moving existing regional descriptors (presented in parentheses in previous versions of the *Action Plan for Australian Birds*) ahead of the species English name, for example 'Bulloo Grey Grasswren' as opposed to 'Grey Grasswren (Bulloo)' (Table S1). In applying geographic epithets for remaining subspecies the following practices were applied.

Easily understood or well-known geographic terms such as directional words (e.g. Eastern, Western, Inland, etc.), or major names of regions (e.g. Pilbara, Torresian, Cape York, Tasmanian, Capricorn, Australian) were preferred. More local names were used for small range taxa where those names effectively characterised their very limited distributions (e.g. Grey Range Thick-billed Grasswren, Gulf St Vincent Slender-billed Thornbill). Application of more localised geographic names may be appropriate for future iterations of subspecies lists in light of some potentially cumbersome names (e.g. Central Queensland Coast Black-faced Woodswallow – although names of this length are rare).

'Conflicting geographies' were avoided as far as possible. Many species names already have a 'directional' geographic descriptor in their name (e.g. Eastern, Western, Northern, Southern). Adding a further 'directional' descriptor to a subspecies name is likely to result in confusion (e.g. 'Western Southern Emu-wren' or even 'Eastern Western Gerygone'). In these cases, more localised geographic names were used (e.g. Wet Tropics Eastern Spinebill). An exception to this was the eastern subspecies of the Eastern Reef Egret *Egretta sacra sacra* which had no localized geographic name. In this case the name Common Eastern Reef Egret was adopted given that the only other subspecies, *E. s. albolineata*, is confined to New Caledonia and the Loyalty Islands.

A pragmatic approach to use of descriptive terms such as 'island' and 'ocean' was employed. In line with general practice for bird names, length was minimised. However, omitting some descriptive terms from some names can cause confusion. For instance, as noted in Garnett (1993), birds from Norfolk Island (Australia) need the term Island in the name if they are not to be linked to East Anglia (in England) and "the shag from Heard Island is no more audible than the shag from Macquarie Island". Similarly, omission of the term 'island' for Kangaroo Island endemics would result in a nonsensical mix of mammal and bird in some cases, e.g. Kangaroo Little Wattlebird, and so the term 'Island' is thus retained in such names. On the other hand, for instance, the epithet

'Lord Howe Island', not only makes for a long name but the term 'Lord Howe' has not been ascribed to any other geographic locality on earth. Thus, in this case, the term 'island' can be safely omitted, as it was for Recherche (Archipelago), Houtman Abrolhos, Dirk Hartog, Cocos Keeling, Dorre and Tiwi. Similarly, the term 'ocean' was generally omitted where possible – e.g. Atlantic Common Tern *Sterna hirundo hirundo* instead of Atlantic Ocean Common Tern, Indo-Pacific Lesser Frigatebird *Fregata ariel ariel*, Pacific Sooty Tern *Onychoprion fuscatus serrata*. This is consistent with existing practice for species names – e.g. Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos*. The word 'ocean' was however retained in the case of Indian Ocean taxa – e.g. Indian Ocean Sooty Tern *Onychoprion fuscatus nubilosa* – given such names as Indian Sooty Tern would suggest the taxon's distribution was based in India (notwithstanding that the established name for the albatross species *Thalassarche carteri* is Indian Yellow-nosed Albatross).

Phenotypic epithets

While subspecies are generally distinguished from conspecifics by relatively fine phenotypical differences, a significant number do have readily observable plumages, morphologies or calls. A total of 25 subspecies names listed here utilise morphological or colour-based epithets (Tables 1 and S1). All phenotypically-based subspecies names listed have existing precedence and morphological or colour-based names were only applied to taxa that are readily identifiable in the field. While the number of subspecies with phenotypic names is small in this initial listing (2.4%), there is scope for more phenotypically-based names to be applied to subspecies in future as only phenotypic names with precedence were applied here. Such names should only be used where phenotypical characters are diagnosable and of potential utility in the field or generally help characterise the subspecies in some socially meaningful way. Phenotypical names are potentially attractive alternative to geographic names in situations where subspecies have novel migratory patterns and overlap with conspecifics, but do not hybridise – e.g. Tasmanian Silvereyes *Zosterops lateralis lateralis* which are routinely distinguished from mainland Australian Silvereye subspecies (by buff coloured plumage on their sides) in their non-breeding range in Australia. Identification of migratory subspecies which co-occur with conspecifics in part of their range is potentially highly useful as this is the only way to attain information on non-breeding ranges of some subspecies (spatial intersections cannot be used in these cases) and in some cases, non-breeding subspecies climate spaces are predicted to shift in novel ways (Garnett and Franklin 2014).

Other epithets

Habitat epithets are useful in characterising birds – e.g. Mangrove Robin as distinct from other Australian robins, none of which occupy mangrove habitats. There are 48 habitat-based bird names for Australian species (BirdLife Australia 2016). For subspecies, 10 names were initially assigned habitat-based epithets (Table 1), three of which have existing provenance; Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso* (Johnstone and Kirby 1999), Paperbark Flycatcher *Myiagra inquieta nana* (Schodde and Mason 1999) and Mallee Ringneck *Barnardius zonarius barnardi*. The remaining eight were applied to subspecies which have well known and distinct habitat preferences (Table 1). However, the application of habitat descriptors was conservative, and there is an opportunity for more habitat-based subspecies names in future, i.e. where subspecies have distinct habitat preferences in relation to conspecifics. Habitat-based epithets are also potentially useful in situations where taxa have novel geographic ranges and cannot easily be described using a geographic term.

Seven subspecies have previously been named after people as species (e.g. Gibson's Albatross, Butler's Corella, Muir's Corella, Gould's Bronze-Cuckoo), and these named are retained here (Table 1). No subspecies could be ascribed to 34 taxa (3.2% of total) and so the subspecies name is suffixed with 'ssp.'. Of these, three are introduced species of unknown, and possibly mixed, provenance

(Common Pheasant *Phasianus colchicus*, Eurasian Tree Sparrow *Passer montanus*, Common Greenfinch *Chloris chloris*), three are rare or poorly studied migrants (an unknown subspecies of Roseate Tern *Sterna dougallii* in addition to *S. d. gracilis* and *S. d. bangsi*, Common Redshank *Totanus totanus*, and Grey Wagtail *Motacilla cinerea*) and the remaining 26 are vagrants (with very limited occurrence in Australian territories) that could not be identified to subspecies. No behaviour or voice-based epithets were applied to subspecies, although there is some potential for such names as bird calls do vary between subspecies, sometimes obviously, and this may be useful in distinguishing some subspecies from conspecifics.

Future directions

In this first attempt at introducing subspecies names for Australian birds a relatively conservative approach was taken using geography as the primary basis for distinguishing subspecies by name. Only where a name had precedence in formal literature, bird field guides or was widely used in the vernacular (e.g. in avicultural circles) were those names applied. Other examples of subspecies names may persist in common usage and warrant revival (e.g. Turquoise Fairy-wren for *Malurus splendens musgravi* which is listed provisionally here as Central Splendid Fairy-wren). Application of these or other names should be considered on a case-by-case basis by nomenclatural committees with reference to local considerations and under a consistent practice and convention. Secondly, as mentioned, some geographically-based names are long and more succinct local geographic terms may be preferable. Third, although it is argued that well established names for subspecies (as well as for species) should be retained where possible given their social importance, refinement of some names is inevitable for a variety of social and taxonomic reasons, as happens with other such lists (e.g. the list of standard names for American reptiles and amphibians is up to its sixth edition; Collins and McTaggart 2009). A process for updating and refining subspecies names and promoting their establishment across legislation, educational/recreational materials and in research should be established in consultation with national/regional nomenclatural committees and those committees should have a connection with local groups. Finally, it may also be appropriate that Indigenous names form part of a subspecies vernacular name, particularly if the geographic range of the subspecies is confined to one or a small number of Indigenous clan groups. However, this would require full prior and informed consent from the Indigenous groups concerned and consideration of any societal significance associated with an existing non-Indigenous name.

Conclusions

Given the rapidly changing taxonomic status of birds in the modern era of taxonomy, unique vernacular identities for all species and subspecies are a significant benefit over the inconsistent, informal and incomplete application which now occurs. While classifications of species and above (i.e. genera, family and order) are inherently unstable, terminal taxa or 'ultrataxa' (Schodde and Mason 1999) are by nature stable, and the practice of affording subspecies (and species) identities through standardised English vernacular names ensures public recognition is retained, confusion among taxa is reduced, and debates around taxonomic classification, which are of little consequence to the conservation of Australian birds, can remain within the specialist literature.

While we do not expect that all subspecies names will necessarily find their way into common usage, it is clear that many subspecies names are already widely used and are important for conservation or ornithological research. Given the increasing interest in subspecies (particularly for conservation) and taxonomic instability, we expect the usage of English subspecies names to increase in the future. Principally, we hope that recognition of standardised English names helps scientists, politicians, land managers and the general public to appreciate the full diversity of Australian birds for which we have responsibility.

Supplementary Material

To view supplementary material for this article, please visit https://doi.org/10.1017/S0959270916000538

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