**Supplemental Material**

**Supplemental Figure S1.** Land connections between Australia and New Guinea over the last 100 thousand years. From the Sahul Time web site (<http://sahultime.monash.edu.au/explore.html>).

**Supplemental Figure S2.** Principal Components Analysis of *Melithreptus albogularis*. PCoA of SNP data from White-throated Honeyeaters *Melithreptus albogularis* collected from Australia (Northern Territory: green; Queensland: red) and Papua New Guinea (Central Province: black; Oro Province: blue). Axis 1 shows the most amount of variation (34.1%).

**Supplemental Table S1**. Enumeration of land birds in the Australian savannas (Kimberley, Top End, Cape York Peninsula) and New Guinean (Trans-Fly, Central Province, Oro Province) savannas*.* **Submitted as separate Excel file.**

**Supplemental Table S2**. Summary of endemism of birds in the Trans-Fly and Central Province savannas and associated habitats of mangroves and wetlands. Taxa originally named as being isolated and/or endemic to at least one of these regions are included. Taxa with type-localities beyond these regions and part of more widely distributed lowland New Guinean ranges are excluded, e.g., Peaceful Dove *Geopelia striata papua*, Grey Shrike-thrush *Colluricincla harmonica tachycrypta*. None are endemic to Oro Province, which is excluded for brevity. See Beehler and Pratt (2016) for nomenclatural details of all taxa.

**Supplemental Methods and Results. 1.** Methods used in deriving maps in Figure 1 from Paijmans (1975) and Bellamy and McAlpine (1995). **2**. Methods used in compiling supplemental Table S1. **3.** Methods used in and Results from generating single nucleotide polymorphism (SNP) data for White-throated Honeyeaters *Melithreptus albogularis* from Central and Oro Province savannas (PNG), and Cape York Peninsula, eastern Queensland, and the Northern Territory (Australia).

**Supplemental References.** References not cited in main text but relevant to New Guinean savanna birds and generation of Supplemental Table S1.

**Supplemental Figure S1.** Land connections between Australia and New Guinea over the last 100 thousand years. From the Sahul Time web site (http://sahultime.monash.edu.au/explore.html).

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| **Supplementary Table 1. Compilation of tropical savanna woodland avian species records for subregions (1-6):** |  |  |  |  |  |
|  Northern Australia (1. Kimberly; 2. Northern Territory Top End; 3. Cape York Peninsula); and  |  |  |  |  |  |
|  Papua New Guinea (4.Trans-Fly; 5. Central Province; 6. Oro Province) |   |   |  |  |  |  |  |
|  Nomenclature follows Non- passerines: Dickinson & Remsen (2013) and Passerines: Dickinson & Christidis (2014) |  |  |  |  |  |
|  Species more associated with grasslands#; species more reliant on more forested habitats## |  |  |  |  |  |
|  Species uncommon\* or seasonal migrant\*\* within the subregion |   |   |   |  |  |  |  |  |
|   |   |   |   |   |  |  |  |  |  |
| **COMMON NAMES** | **SCIENTIFIC NAMES (AUTHORITY)** |  **Subregions** |  |  |  |  |  |  |  |
|  |  | **1** | **2** | **3** | **4** | **5** | **6** |  |  |
| Oriental Cuckoo | *Cuculus optatus* Gould, 1845 | \*\* | \*\* | \*\* | \*\* | \*\* | \*\* |  |  |
| White-winged Triller | *Lalage tricolor* (Swainson, 1825)  | \*\* | \*\* | \*\* | \*\* | x\*\* | \*\* |  |  |
| Brown Quail# | *Synoicus ypsilophorus* (Bosc, 1792) | x | x | x | x | x | x |  |  |
| King Quail# | *Synoicus chinensis* (Linnaeus, 1766) | x | x | x | x | x | x |  |  |
| Peaceful Dove | *Geopelia placida* Gould, 1844 | x | x | x | x | x | x |  |  |
| Pheasant Coucal | *Centropus phasianinus* (Latham, 1801)  | x | x | x | x | x | x |  |  |
| Brush Cuckoo## | *Cacomantis variolosus* (Vigors & Horsfield, 1827) | x | x | x | x | x | x |  |  |
| Pacific Baza | *Aviceda subcristata* (Gould, 1838)  | x | x | x | x | x | x |  |  |
| Brown Goshawk | *Accipiter fasciatus* (Vigors & Horsfield, 1827)  | x | x | x | x | x | x |  |  |
| Collared Sparrowhawk | *Accipiter cirrocephalus* (Vieillot, 1817)  | x | x | x | x | x | x |  |  |
| Whistling Kite | *Haliastur sphenurus* (Vieillot, 1818)  | x | x | x | x | x | x |  |  |
| Black Kite# | *Milvus migrans* (Boddaert, 1783)  | x | x | x | ? | x | x |  |  |
| Australian Barn Owl | *Tyto delicatula* (Gould, 1837)  | x | x | x | ? | x | x |  |  |
| Barking Owl | *Ninox connivens* (Latham, 1801)  | x | x | x | x | x | x |  |  |
| Dollarbird | *Eurystomus orientalis* (Linnaeus, 1766)  | x | x | x | x\*\* | x\*\* | x\*\* |  |  |
| Sacred Kingfisher | *Todiramphus sanctus* (Vigors & Horsfield, 1827)  | x | x | x | \* | x | x |  |  |
| Brown Falcon | *Falco berigora* Vigors & Horsfield, 1827 | x | x | x | x | x | x |  |  |
| Peregrine Falcon | *Falco peregrinus* Tunstall, 1771 | x | x | x | x | x | x |  |  |
| Sulphur-crested Cockatoo | *Cacatua galerita* (Latham, 1790)  | x | x | x | x | x | x |  |  |
| White-throated Honeyeater | *Melithreptus albogularis* Gould, 1848 | x | x | x | x | x | x |  |  |
| White-bellied Cuckoo-shrike | *Coracina papuensis* (J.F. Gmelin, 1788)  | x | x | x | x | x | x |  |  |
| Grey Shrike-thrush | *Colluricincla harmonica* (Latham, 1801)  | x | x | x | x | x | x |  |  |
| Spangled Drongo | *Dicrurus bracteatus* Gould, 1843  | x | x | x | x\*\* | x | x |  |  |
| Northern Fantail | *Rhipidura rufiventris* (Vieillot, 1818)  | x | x | x | x | x | x |  |  |
| Willie-wagtail | *Rhipidura leucophrys* (Latham, 1801)  | x | x | x | x | x | x |  |  |
| Torresian Crow | *Corvus orru* Bonaparte*,* 1850 | x | x | x | x | x | x |  |  |
| Leaden Flycatcher | *Myiagra rubecula* (Latham, 1801)  | x | x | x | x\*\* | x | x |  |  |
| Lemon-bellied Robin | *Microeca flavigaster* Gould*,*1843 | x | x | x | x | x | x |  |  |
| Golden-headed Cisticola# | *Cisticola exilis* (Vigors & Horsfield, 1827)  | x | x | x | x | x | x |  |  |
| Bar-shouldered Dove | *Geopelia humeralis* (Temminck, 1821) | x | x | x | x | x |   |  |  |
| Australian Bustard | *Ardeotis australis* (J.E. Gray, 1829)  | x | x | x | x |   |   |  |  |
| Bush Stone-curlew | *Burhinus grallarius* (Latham, 1801) | x | x | x | x |   |   |  |  |
| Wedge-tailed Eagle | *Aquila audax* (Latham, 1801)  | x | x | x | x |   |   |  |  |
| Australian Masked Owl | *Tyto novaehollandiae* (Stephens, 1826)  | x | x | x | x |   |   |  |  |
| Southern Boobook | *Ninox boobook* (Latham, 1801) | x | x | x | x |   |   |  |  |
| Little Corella | *Cacatua sanguinea* Gould, 1843 | x | x |   | x |   |   |  |  |
| Red-winged Parrot | *Aprosmictus erythropterus* (J.F. Gmelin, 1788)  | x | x | x | x |   |   |  |  |
| Brown Honeyeater | *Lichmera indistincta* (Vigors & Horsfield, 1827)  | x | x | x | x |   |   |  |  |
| Blue-faced Honeyeater | *Entomyzon cyanotis* (Latham, 1801)  | x | x | x | x |   |   |  |  |
| Little Friarbird | *Philemon citreogularis* (Gould, 1837)  | x | x | x | x |   |   |  |  |
| Grey-crowned Babbler | *Pomatostomus temporalis* (Vigors & Horsfield, 1827)  | x | x | x | x |   |   |  |  |
| Olive-backed Oriole | *Oriolus sagittatus* (Latham, 1801)  | x | x | x | x |   |   |  |  |
| Green Oriole | *Oriolus flavocinctus* (P.P. King, 1826)  | x | x | x | x |   |   |  |  |
| Magpie-lark | *Grallina cyanoleuca* (Latham, 1801)  | x | x | x | x |   |   |  |  |
| Australian Magpie | *Gymnorhina tibicen* (Latham, 1801)  | x | x | \* | x |   |   |  |  |
| Black-faced Woodswallow | *Artamus cinereus* Vieillot, 1817 | x | x | \* | x |   |   |  |  |
| Paperbark Flycatcher | *Myiagra nana* (Gould, 1870) | x | x | \* | x |   |   |  |  |
| Crimson Finch | *Neochmia phaeton* (Hombron & Jacquinot, 1841)  | x | x | \* | x |   |   |  |  |
| Australian Owlet-nightjar | *Aegotheles cristatus* (Shaw, 1790)  | x | x | x | x | x |   |  |  |
| Blue-winged Kookaburra | *Dacelo leachii* Vigors & Horsfield, 1827 | x | x | x | x | x |   |  |  |
| Forest Kingfisher | *Todiramphus macleayii* (Jardine & Selby, 1830)  |   | x | x | \*\* | x\*\* | \*\* |  |  |
| Chestnut-breasted Mannikin# | *Lonchura castaneothorax* (Gould, 1837)  | x | x | x |   | x | x |  |  |
| White-throated Gerygone  | *Gerygone olivacea* (Gould, 1838)  | x | x | x |   | x |   |  |  |
| Australasian Figbird | *Sphecotheres vieilloti* Vigors & Horsfield1827 | x | x | x |   | x |   |  |  |
| Jacky Winter | *Microeca fascinans* (Latham, 1801)  | x | x | \* |   | x |   |  |  |
| Yellow-tinted Honeyeater | *Ptilotula flavescens* (Gould, 1840)  | x |   | \* |   | x |   |  |  |
| Horsfield's Bushlark# | *Mirafra javanica* Horsfield*,* 1821 | x | x |   | x | x |   |  |  |
| Dusky Honeyeater | *Myzomela obscura* Gould, 1843 |   | x | x | x | x |   |  |  |
| Rufous-banded Honeyeater | *Conopophila albogularis* (Gould, 1843)  |   | x | x | x | x | x |  |  |
| Helmeted Friarbird | *Philemon buceroides* (Swainson, 1837)  |   | x | x | x | x | x |  |  |
| Palm Cockatoo## | *Probosciger aterrimus* (J.F. Gmelin, 1788)  |   |   | x | x | x | x |  |  |
| Rainbow Lorikeet | *Trichoglossus haematodus* (Linnaeus, 1771)  |   |   | x | x | x | x |  |  |
| Fawn-breasted Bowerbird | *Chlamydera cerviniventris* Gould*,* 1850 |   |   | x | x | x | x |  |  |
| Brown-backed Honeyeater | *Ramsayornis modestus* (G.R. Gray, 1858)  |   |   | x | x | x | x |  |  |
| Olive-backed Sunbird## | *Cinnyris jugularis* (Linnaeus, 1766)  |   |   | x | x | x | x |  |  |
| Red-backed Buttonquail# | *Turnix maculosa (*Temminck, 1815)  |   |   | x | x | x |   |  |  |
| Black-backed Butcherbird | *Cracticus mentalis* Salvadori & d'Albertis, 1876 |   |   | x | x | x |   |  |  |
| Noisy Friarbird | *Philemon corniculatus* (Latham, 1790)  |   |   | x | x |   |   |  |  |
| Black-winged Kite# | *Elanus caeruleus* (Desfontaines, 1789) |   |   |   | x |   |   |  |  |
| Lesser Black Coucal# | *Centropus bernsteini* Schlegel, 1866 |   |   |   | x |   |   |  |  |
| Spangled Kookaburra## | *Dacelo tyro* G.R. Gray, 1858 |   |   |   | x |   |   |  |  |
| Grey-crowned Mannikin# | *Lonchura nevermanni* Stresemann, 1934 |   |   |   | x |   |   |  |  |
| Black Mannikin | *Lonchura stygia Stresemann, 1934* |   |   |   | X |   |   |  |  |
| Yellow-streaked Lory | *Chalcopsitta scintillata* (Temminck, 1835) |   |   |   | x | x |   |  |  |
| Papuan Nightjar## | *Eurostopodus papuensis* (Schlegel, 1866) |   |   |   | x | x | x |  |  |
| Long-tailed Honey Buzzard | *Henicopernis longicauda* (Lesson & Garnot, 1828*)* |   |   |   | x | x | x |  |  |
| Eastern Marsh Harrier | *Circus spilonotus* Kaup, 1847 |   |   |   | x | x | x |  |  |
| Variable Goshawk## | *Accipiter hiogaster* (S. Muller, 1941) |   |   |   | x | x | x |  |  |
| Doria's Hawk## | *Megatriorchis doriae* Salvadori & D'Albertis |   |   |   | x | x | x |  |  |
| Blue-tailed Bee-eater# | *Merops philippinus* Linnaeus, 1767 |   |   |   | x | ? | x |  |  |
| Oriental Hobby | *Falco severus* Horsfield, 1821 |   |   |   | x | x | x |  |  |
| Back-capped Lory## | *Lorius lory* (Linneaus, 1758) |   |   |   | x | x | x |  |  |
| Dusky Lory## | *Pseudeos fuscata* (Blyth, 1858) |   |   |   | x | x | x |  |  |
| White-shoulderd Fairywren | *Malurus alboscapulatus* A.B. Meyer, 1874 |   |   |   | x | x | x |  |  |
| Hooded Butcherbird | *Cracticus cassicus* (Boddaert, 1783) |   |   |   | x | x | x |  |  |
| Streaked-headed Mannikin# | *Lonchura tristissima* (Wallace, 1865) |   |   |   | x | x | x |  |  |
| Bat Hawk | *Macheiramphus alcinus* Bonaparte, 1850 |   |   |   |   | x | x |  |  |
| Gurney's Eagle## | *Aquila gurneyi* G.R. Gray, 1861 |   |   |   |   | x | x |  |  |
| Jungle Boobook | *Ninox theomacha* (Bonaparte, 1855) |   |   |   |   | x | x |  |  |
| Silver-eared Honeyeater | *Lichmera alboauricularis* (E.P. Ramsay, 1878) |   |   |   |   | x | x |  |  |
| Brown Oriole | *Oriolus szalayi* (von Madarasz, 1900) |   |   |   |   | x | x |  |  |
| Grey-headed Mannikin | *Lonchura caniceps* (Salvadori, 1876) |   |   |   |   | x | x |  |  |
| Pied Bush Chat | *Saxicola caprata* (Linnaeus, 1766) |   |   |   |   | x | x |  |  |
| Squatter Pigeon | *Geophaps scripta* (Temminck, 1821)  |   |   | \* |   |   |   |  |  |
| Black-eared Cuckoo | *Chalcites osculans* Gould, 1847  |   |   | \* |   |   |   |  |  |
| Golden-shouldered Parrot | *Psephotellus chrysopterygius* (Gould, 1857) |   |   | \* |   |   |   |  |  |
| Scaly-breasted Lorikeet | *Trichoglossus chlorolepidotus* (Kuhl, 1820) |   |   | \* |   |   |   |  |  |
| Brown Treecreeper | *Climacteris picumnus* Temminck, 1824 |   |   | \* |   |   |   |  |  |
| Buff-breasted Buttonquail# | *Turnix olivii* Robinson, 1900 |   |   | x |   |   |   |  |  |
| Laughing Kookaburra | *Dacelo novaeguineae* (Hermann, 1783)  |   |   | x |   |   |   |  |  |
| Pale-headed Rosella | *Platycercus adscitus* (Latham, 1790)  |   |   | x |   |   |   |  |  |
| Yellow Honeyeater | *Stomiopera flava* (Gould, 1843)  |   |   | x |   |   |   |  |  |
| Red-browed Pardalote | *Pardalotus rubricatus* Gould, 1838 | \* | \* | x |   |   |   |  |  |
| Hooded Parrot | *Psephotellus dissimilis* (Collett, 1898) |   | \* |   |   |   |   |  |  |
| Crested Pigeon | *Ocyphaps lophotes* (Temminck, 1822)  | \* |   | \* |   |   |   |  |  |
| Spotted Nightjar | *Eurostopodus argus* E. Hartert, 1892 | \* | \* | \* | \*\* |   |   |  |  |
| Pallid Cuckoo | *Heteroscenes pallidus* (Latham, 1801)  | x | \* | x | \*\* |   |   |  |  |
| Black-shouldered Kite# | *Elanus axillaris* (Latham, 1801)  | x | \* | x |   |   |   |  |  |
| Emu | *Dromaius novaehollandiae* (Latham, 1790) | x | x | x |   |   |   |  |  |
| Channel-billed Cuckoo | *Scythrops novaehollandiae* Latham, 1790 | x | \* | x | \*\* | \*\* | \*\* |  |  |
| Rainbow Bee-eater# | *Merops ornatus* Latham, 1801 | x | x | x | \*\* | \*\* | \*\* |  |  |
| Nankeen Kestrel# | *Falco cenchroides* Vigors, 1827 | x | x | x | \*\* | \*\* | \*\* |  |  |
| Australian Hobby | *Falco longipennis* Swainson, 1838 | x | x | x | \*\* | \*\* | \*\* |  |  |
| Swamp Harrier# | *Circus approximans* Peale, 1848 | x | x | x | \*\* |   |   |  |  |
| Little Eagle | *Hieraaetus morphnoides* (Gould, 1841)  | x | x | x |   |   |   |  |  |
| Tawny Frogmouth | *Podargus strigoides* (Latham, 1802)  | x | x | x |   |   |   |  |  |
| Spotted Harrier | *Circus assimilis* Jardine & Selby, 1828 | x | x | x |   |   |   |  |  |
| Gray Goshawk## | *Accipiter novaehollandiae* (J.F. Gmelin, 1788)  | x | x | x |   |   |   |  |  |
| Red Goshawk | *Erythrotriorchis radiatus* (Latham, 1801)  | x | x | x |   |   |   |  |  |
| Black-breasted Buzzard | *Hamirostra melanosternon* (Gould, 1841)  | x | x | x |   |   |   |  |  |
| Red-backed Kingfisher | *Todiramphus pyrrhopygius* (Gould, 1841)  | x | x | x |   |   |   |  |  |
| Red-tailed Black-Cockatoo | *Calyptorhynchus banksii* (Latham, 1790)  | x | x | x |   |   |   |  |  |
| Galah | *Eolophus roseicapilla* (Vieillot, 1817) | x | x | x |   |   |   |  |  |
| Great Bowerbird | *Chlamydera nuchalis* (Jardine & Selby, 1830)  | x | x | x |   |   |   |  |  |
| Red-backed Fairywren# | *Malurus melanocephalus* (Latham, 1801)  | x | x | x |   |   |   |  |  |
| Bar-breasted Honeyeater | *Ramsayornis fasciatus* (Gould, 1843)  | x | x | x |   |   |   |  |  |
| Banded Honeyeater | *Certhionyx pectoralis* (Gould, 1841)  | x | x | x |   |   |   |  |  |
| Silver-crowned Friarbird | *Philemon argenticeps* (Gould, 1840) | x | x | x |   |   |   |  |  |
| Striated Pardalote | *Pardalotus striatus* (J.F. Gmelin, 1789)  | x | x | x |   |   |   |  |  |
| Weebill | *Smicrornis brevirostris* (Gould, 1838)  | x | x | x |   |   |   |  |  |
| Varied Sittella | *Daphoenositta chrysoptera* (Latham, 1801)  | x | x | x |   |   |   |  |  |
| Black-faced Cuckoo-shrike | *Coracina novaehollandiae* (Gmelin, 1789)  | x | x | x | \*\* | \*\* | \*\* |  |  |
| Rufous Whistler | *Pachycephala rufiventris* (Latham, 1801)  | x | x | x |   |   |   |  |  |
| Little Woodswallow | *Artamus minor* Vieillot, 1817 | x | x | x |   |   |   |  |  |
| Mistletoebird | *Dicaeum hirundinaceum* (Shaw, 1792)  | x | x | x |   |   |   |  |  |
| Double-barred Finch | *Taeniopygia bichenovii* (Vigors & Horsfield, 1827)  | x | x | x |   |   |   |  |  |
| Masked Finch | *Poephila personata* Gould*,* 1842 | x | x | x |   |   |   |  |  |
| Tree Martin | *Petrochelidon nigricans* (Vieillot, 1817)  | x | x | x | \*\* | \*\* | \*\* |  |  |
| Fairy Martin | *Petrochelidon ariel* (Gould, 1842)  | x | x | x | \*\* | \*\* |   |  |  |
| Rufous Songlark # | *Cincloramphus mathewsi* Iredale, 1911  | x | x | \*\* | \*\* | \*\* | \*\* |  |  |
| Common Bronzewing | *Phaps chalcoptera* (Latham, 1790)  | x | x | \* |   |   |   |  |  |
| Red-chested Buttonquail# | *Turnix pyrrhothorax* (Gould, 1841)  | x | x | \* |   |   |   |  |  |
| Square-tailed Kite | *Lophoictinia isura* (Gould, 1838)  | x | x | \* |   |   |   |  |  |
| Varied Lorikeet | *Psitteuteles versicolor* (Lear, 1831) | x | x | \* |   |   |   |  |  |
| Rufous-throated Honeyeater | *Conopophila rufogularis* (Gould, 1843)  | x | x | \* |   |   |   |  |  |
| Australian Pipit## | *Anthus australis* Vieillot *,* 1818 | x | x | \* |   |   |   |  |  |
| Partridge Pigeon | *Geophaps smithii* (Jardine & Selby, 1830) | x | x |   |   |   |   |  |  |
| Chestnut-backed Buttonquail | *Turnix castanotus* (Gould, 1840) | x | x |   |   |   |   |  |  |
| Northern Rosella | *Platycercus venustus* (Kuhl, 1820)  | x | x |   |   |   |   |  |  |
| Rainbow-collared Lorikeet | *Trichoglossus rubritorquis* Vigors & Horsfield, 1827 | x | x |   |   |   |   |  |  |
| Black-tailed Treecreeper | *Climacteris melanura* Gould, 1843 | x | x |   |   |   |   |  |  |
| Variegated Fairywren | *Malurus lamberti* Vigors & Horsfield, 1827 | x | x |   |   |   |   |  |  |
| Singing Honeyeater | *Gavicalis virescens* (Vieillot, 1817)  | x | x |   |   |   |   |  |  |
| Yellow-throated Miner | *Manorina flavigula* (Gould, 1840)  | x | x |   |   |   |   |  |  |
| Northern Shrike-tit | *Falcunculus whitei* A.J. Campbell, 1910 | x | x |   |   |   |   |  |  |
| Pied Butcherbird | *Cracticus nigrogularis* (Gould, 1837)  | x | x |   |   |   |   |  |  |
| Silver-backed Butcherbird | *Cracticus argenteus* Gould, 1841 | x | x |   |   |   |   |  |  |
| Eastern Hooded Robin | *Melanodryas cucullata* (Latham, 1801) | x | x |   |   |   |   |  |  |
| Star Finch | *Neochmia ruficauda* (Gould, 1837)  | x | x |   |   |   |   |  |  |
| Long-tailed Finch | *Poephila acuticauda* (Gould, 1840)  | x | x |   |   |   |   |  |  |
| Gouldian Finch | *Chloebia gouldiae* (Gould, 1844)  | x | x |   |   |   |   |  |  |
| Yellow-rumped Mannikin | *Lonchura flaviprymna* (Gould, 1845)  | \* | x |   |   |   |   |  |  |
| Diamond Dove | *Geopelia cuneata* (Latham, 1801)  | x | \* | \* |   |   |   |  |  |
| Black Falcon | *Falco subniger* G.R*.* Gray, 1843 | x | \* | \* |   |   |   |  |  |
| Black-chinned Honeyeater | *Melithreptus gularis* (Gould, 1837) | x | \* | \* |   |   |   |  |  |
| Pictorella Mannikin | *Heteromunia pectoralis* (Gould, 1841)  | x | \* |   |   |   |   |  |  |
| Little Buttonquail# | *Turnix velox* (Gould, 1841) | x |   |   |   |   |   |  |  |
| Grey Falcon | *Falco hypoleucos* Gould 1841 | \* |   | \* |   |   |   |  |  |
| Welcome Swallow | *Hirundo neoxena* Gould*,* 1842 |   |   | \*\* |   |   |   |  |  |
| Cockatiel | *Nymphicus* *hollandicus* (Kerr, 1792)  | \* | \* |   |   |   |   |  |  |
| Horsfield's Bronze Cuckoo | *Chalcites basalis* (Horsfield, 1821)  | \* | \* | \* | \*\* |   |   |  |  |

**Supplemental Table S2. Summary of endemism of birds in the Trans-Fly and Central Province savannas and associated habitats of mangroves and wetlands. Taxa originally named as being isolated and/or endemic to at least one of these regions are included. Taxa with type-localities beyond these regions and part of more widely distributed lowland New Guinean ranges are excluded, e.g., Peaceful Dove *Geopelia striata papua*, Grey Shrike-thrush *Colluricincla harmonica tachycrypta*. None are endemic to Oro Province, which is excluded for brevity. See Beehler and Pratt (2016) for nomenclatural details of all taxa.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Trans-Fly | Central | Isolated in New Guinea to indicated region | Notes |
| **Species-level taxa** |  |  |  |  |
| *Tanysiptera hydrocharis* | + |  | Yes | Also Aru Islands. Rainforest; see text. |
| *Dacelo tyro* | + |  | Yes | Also Aru Islands |
| *Megalurus albolimbatus* | + |  | Yes | Wetlands rather than wooded savanna |
| *Lonchura nevermanni* | + |  | Yes | Open grasslands and associated wetlands  |
| *Lonchura stygia* | + |  | Yes | Open grasslands and associated wetlands |
|  |  |  |  |  |
| **Subspecies currently recognized** |  |  |  |  |
| *Synoicus ypsilophorus dogwa* | + |  | No |  |
| *Ptilinopus iozonus iozonus* | + |  | Yes | Also on Aru Islands  |
| *Accipiter fasciatus dogwa* | + |  | No |  |
| *Tyto novaehollandiae calabyi* | + |  | Yes |  |
| *Ninox boobook pusilla* | + |  | Yes |  |
| *Dacelo leachii superflua* | + |  | Yes |  |
| *Dacelo leachii intermedia* | + | + | Yes |  |
| *Dacelo tyro archboldi* | + |  | Yes | *D. t. tyro* on Aru Islands |
| *Cacatua sanguinea transfreta* | + |  | Yes |  |
| *Cacatua galerita eleonora* | ? |  | No | Small Aru Islands form; ?also in Trans-Fly |
| *Philemon citreogularis papuensis* | + |  | Yes |  |
| *Entomyzon cyanotis harterti*  | + |  | Yes |  |
| *Ptilotula flavescens germana* |  | + | Yes |  |
| *Sericornis beccarii randi* | + |  | Yes |  |
| *Gerygone olivacea cinerascens* |  | + | Yes |  |
| *Gerygone palpebrosa tarara* | + |  | No |  |
| *Melloria quoyi alecto* | + |  | No | Mangroves; also on Aru Islands |
| *Gymnorhina tibicen papuana* | + |  | Yes |  |
| *Sphecotheres vieilloti salvadorii* |  | + | Yes |  |
| *Oriolus sagittatus magnirostris* | + |  | Yes |  |
| *Myiagra alecto wardelli* | + |  | No |  |
| *Microeca flavigaster tarara* | + |  | No |  |
| *Microeca fascinans zimmeri* |  | + | Yes |  |
| *Cincloramphus timoriensis muscalis* | + |  | Yes |  |
| *Dicaeum geelvinkianum albopuncatatum* | + |  | No |  |
| *Neochmia phaeton evangelinae* | + |  |  |  |
|  |  |  |  |  |
| **Isolated; never named (excludes seasonal migrants)** |  |  |  |  |
| *Anseranas semipalmata* | + |  | Yes | See Roshier *et al.* (2012) for genetic study |
| *Aquila audax* | + |  | Yes |  |
| *Philemon corniculatus* | + |  | Yes |  |
| *Lichmera indistincta* | + |  | Yes | Also on Aru Islands |
| *Melithreptus albogularis* | + | + | Yes | Also in Oro Province  |
| *Artamus cinereus* | + |  | Yes |  |
| *Myiagra nana* | + |  | Yes |  |
| *Grallina cyanoleuca* | + |  | Yes |  |
| *Rhipidura phasiana* | + | + | Yes |  |
| *Cisticola juncidis* | + |  | Yes |  |
|  |  |  |  |  |
| **Not currently or inconsistently recognized** |  |  | Yes |  |
| *Ducula spilorrhoa tarara* | + |  | No |  |
| *Aegotheles cristatus major*  | + |  | Yes |  |
| *Syma torotoro brevirostris*  | + |  | Yes |  |
| *Aprosmictus erythropterus papua* | + |  | Yes |  |
| *Trichoglossus haematodus caeruleiceps* | + |  | Yes |  |
| *Malurus alboscapulatus dogwa* | + |  | Yes |  |
| *Xanthotis flaviventer tararae* | + |  | Yes |  |
| *Pomatostomus temporalis strepitans* | + |  | Yes |  |
| *Coracina papuensis oriomo* | + |  | Yes |  |
| *Colluricincla megarhyncha goodsoni* | + |  | Yes |  |
| *Colluricincla megarhyncha wuroi* | + |  | Yes |  |
| *Oriolus flavocinctus muelleri* | + |  | Yes |  |

**Supplemental Methods 1, 2 and 3**

1. **Methodology used in generating Vegetation Maps in Figure 1. GIS and Area Calculation**

Two data sources were used in attempting to generate the figures in Table 1 of the main text: Bellamy and McAlpine (1995) and Paijmans (1975), the former consisting of a GIS dataset and accompanying handbook, and the latter consisting of four 1:1,000,000 scale map sheets and accompanying explanatory notes. Though an excellent resource, Bellamy and McAlpine (1995) proved unsuited to our simple aim of estimating area of savanna vegetation.

Paijmans’ (1975) map sheets in .pdf format were added to ArcMap 10.6 and georeferenced against existing shoreline data (source: UN-OCHA). Polygons were then traced manually and saved as a WGS84 shapefile. Polygons classed as ‘Sa’ (savanna) or ‘…/Sa’, ‘Sa/…’ (mixed savanna with various other vegetation types) were mapped together with provincial boundaries (source: UN-OCHA), and the shapefile was projected into Cylindrical Equal Area space for subsequent area calculations.

1. **Methods used in compiling supplemental Table 1.**

In compiling supplemental Table 1, we have used Australian regions (Kimberley, Northern Territory Top End, Cape York Peninsula) *sensu* Bowman *et al*. (2010) and the tropical savannas as outlined by Woinarski and Legge (2013), which in turn followed the bioregionalization of Australia (Thackway and Cresswell 1995).

Inclusion of land bird species for these Australian regions broadly follows Woinarski *et al*. (2000) and Woinarski and Legge (2013) and we have drawn on our own experience over some 40 years in these areas. Many of the ‘savanna woodland’ species we have included do occur in other habitats but secondarily and they are marked accordingly: species more associated with grasslands are marked (#) (e.g., Chestnut-breasted Mannikin *Lonchura castaneothorax*) and those ranging into more forested habitats are marked (##) (e.g., Palm Cockatoo *Probosciger aterrimus*). As well, some species are marginally within the range or on the edge of our distributional species limits or are seasonal migrants within the three Australian subregions and are marked with a single asterisk (\*) or double asterisk (\*\*), respectively.

Omission of other species was guided by making comparisons with New Guinean savanna land birds as direct as possible. Species omitted therefore are those typically *not* found in open savanna woodland and include species confined to spinifex *Triodia* habitats on sandstone escarpments (e.g., *Petrophassa* rock-pigeons, *Amytornis*), those strictly confined to rainforest or riparian *Melaleuca* thickets (e.g., Purple-crowned Fairy-Wren *Malurus coronatus*; Shining Flycatcher *Myiagra alecto*; Varied Triller *Lalage leucomela*; Crimson Finch *Neochmia phaeton*), or species essentially of wetlands and associated grasslands species (all waterfowl, Yellow Chat *Epthianura crocea*).

The New Guinean savanna boundaries broadly follow the sources given for their floristic descriptions as cited in the main text. Land bird species included in them similarly are based on the references cited there and in the supplemental list of References not cited in the main text and museum specimens especially those collected in 2013, 2014 and 2016 by the Australian National Wildlife Collection.

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**3. Single nucleotide polymorphism (SNP) data (Methods and Results) for White-throated Honeyeaters *Melithreptus albogularis* from Central and Oro Province savannas (PNG), and Cape York Peninsula, eastern Queensland, and the Northern Territory (Australia).**

Methods

*Genotype-by-sequencing*

DNA was extracted from 19 White-throated Honeyeater *Melithreptus albogularis*liver samples using the Qiagen Puregene® Tissue Kit following the manufacturer’s protocols. Two were from the Northern Territory (NT) and four were from Cape York Peninsula and eastern Queensland (Qld) in Australia and eight and five were from Oro and Central Province savannas (PNG), respectively. DNA was provided to Diversity Arrays Technology (DArT) with a concentration of 30ng/µl. The DArTseq™ genotype-by-sequencing approach uses a combination of DArT complexity reduction and high throughput sequencing (Killian *et al*. 2012; Courtois *et al*. 2013; Cruz *et al*. 2013) to simultaneously identify and genotype SNP markers in the absence of a reference genome. A combination of two enzymes were used for complexity reduction (PstI-HpaII), before addition of custom adapters (Killian *et al*. 2012) to restriction site overhangs. Fragments were amplified using primers complementary to the adapters. These also incorporated molecular identifier barcode tags, to allow multiplexing of up to 96 samples per sequencing run. PCR conditions consisted of: denaturation at 94°C for 1 minute; 30 cycles of 94°C for 20 seconds, 58°C for 30 seconds and 72°C for 45 seconds; and a final extension period of 72°C for 7 minutes. PCR products were pooled for sequencing on an Illumina HiSeq 2000 platform using 77 cycles of single end sequencing. Raw sequence reads were filtered and processed using a proprietary DArT analytical pipeline. Poor quality sequences were removed, with more stringent criteria being placed upon the barcode region than the rest of the sequence. Approximately 2,000,000 sequences per barcode were identified and used in marker calling, during which identical sequences were collapsed and filtered before screening to identify variable markers using DArT proprietary SNP and SilicoDArT algorithms (DArTsoft14).

*Analysis of genotype-by-sequencing data*

The R package dartR (Gruber *et al*. 2017) was used for population genomic analyses of the DArTseq SNP data, including filtering data and principal coordinates analysis (PCoA). Pairwise distances were computed based on the Hamming distance, where the numbers of positions along the sequence which are different are compared (He *et al*. 2004). SNPs were filtered using the callrate function (0.99) and the RepAvg function (0.99). No monomorphic loci and no duplicate loci per sequence tag were identified so no further filtering was conducted at this stage.

Results

The DArTseq approach generated 22,378 SNPs. After filtering for loci with low reproducibility and loci with missing data, 12,329 SNPs were retained for further analyses. The Qld and PNG samples are all more closely related to each other than either is to the NT samples (Figure S2) but the Central and Oro Province savanna populations are distinguished primarily on PCoA Axis 2. This result is confirmed through the distance matrix (Table S3) in which NT individuals (B22982 and B48619) having a much higher distance score when compared to all other individuals (D = 0.38-0.40). The data have been lodged in Figshare at https://figshare.com/s/00d404838f2eb0f627aa.

**Supplemental Figure S2. Principal Components Analysis (PCoA) of SNP data from White-throated Honeyeaters *Melithreptus albogularis* collected from Australia (Northern Territory: green; Queensland: red) and Papua New Guinea (Central Province: black; Oro Province: blue). Axis 1 shows the most amount of variation (34.1%).**



Supplemental Table S3: Distance matrix for 19 *Melithreptus albogularis* specimens from Australia and PNG. All specimens are from the Australian National Wildlife Collection. Qld – Queensland; NT – Northern Territory; Ori – Oro Province; Central – Central Province.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| \* | B57663-Oro | B43766-QLD | B56038-Central | B57664-Oro | B57915-Central | B57031-Central | B57665-Oro | B57916-Central | B57033-QLD | B57687-Oro | B57931-Central | B57688-Oro | B43679-QLD | B57723-Oro | B48619-NT | B57724-Oro | B29982-NT | B577250-Oro | B55950-Central |
| B57663-Oro | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| B43766-QLD | 0.20 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| B56038-Central | 0.15 | 0.20 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| B57664-Oro | 0.07 | 0.19 | 0.15 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| B57915-Central | 0.13 | 0.19 | 0.13 | 0.13 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| B57031-Central | 0.19 | 0.19 | 0.18 | 0.19 | 0.17 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| B57665-Oro | 0.07 | 0.20 | 0.15 | 0.07 | 0.13 | 0.19 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |  |
| B57916-Central | 0.13 | 0.19 | 0.13 | 0.13 | 0.11 | 0.18 | 0.13 | 0.00 |  |  |  |  |  |  |  |  |  |  |  |
| B57033-QLD | 0.19 | 0.18 | 0.19 | 0.19 | 0.18 | 0.10 | 0.19 | 0.18 | 0.00 |  |  |  |  |  |  |  |  |  |  |
| B57687-Oro | 0.07 | 0.20 | 0.15 | 0.06 | 0.13 | 0.19 | 0.07 | 0.13 | 0.19 | 0.00 |  |  |  |  |  |  |  |  |  |
| B57931-Central | 0.14 | 0.19 | 0.14 | 0.13 | 0.11 | 0.19 | 0.14 | 0.11 | 0.18 | 0.13 | 0.00 |  |  |  |  |  |  |  |  |
| B57688-Oro | 0.07 | 0.20 | 0.15 | 0.06 | 0.13 | 0.19 | 0.07 | 0.13 | 0.19 | 0.00 | 0.13 | 0.00 |  |  |  |  |  |  |  |
| B43679-QLD | 0.20 | 0.15 | 0.20 | 0.21 | 0.19 | 0.19 | 0.20 | 0.20 | 0.19 | 0.21 | 0.20 | 0.21 | 0.00 |  |  |  |  |  |  |
| B57723-Oro | 0.06 | 0.20 | 0.15 | 0.07 | 0.13 | 0.19 | 0.07 | 0.13 | 0.19 | 0.07 | 0.14 | 0.07 | 0.20 | 0.00 |  |  |  |  |  |
| **B48619-NT** | **0.40** | **0.38** | **0.40** | **0.39** | **0.38** | **0.38** | **0.40** | **0.38** | **0.38** | **0.40** | **0.39** | **0.40** | **0.39** | **0.39** | **0.00** |  |  |  |  |
| B57724-Oro | 0.07 | 0.19 | 0.15 | 0.06 | 0.13 | 0.19 | 0.07 | 0.13 | 0.19 | 0.07 | 0.13 | 0.07 | 0.21 | 0.07 | 0.39 | 0.00 |  |  |  |
| **B29982-NT** | **0.40** | **0.38** | **0.39** | **0.39** | **0.38** | **0.38** | **0.39** | **0.38** | **0.38** | **0.39** | **0.39** | **0.39** | **0.39** | **0.39** | ***0.16*** | **0.39** | **0.00** |  |  |
| B577250-Oro | 0.07 | 0.19 | 0.15 | 0.06 | 0.13 | 0.19 | 0.07 | 0.13 | 0.18 | 0.07 | 0.13 | 0.07 | 0.20 | 0.07 | 0.39 | 0.04 | 0.39 | 0.00 |  |
| B55950-Central | 0.16 | 0.20 | 0.11 | 0.15 | 0.14 | 0.19 | 0.15 | 0.14 | 0.19 | 0.15 | 0.14 | 0.15 | 0.21 | 0.15 | 0.39 | 0.15 | 0.39 | 0.15 | 0.00 |

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