Desert bird species found in the Afro-Arabian rift valley desert of the gulf of Aden and southern Red sea region

PJ COWAN

I last tackled the topic of this paper some 24 years ago (Cowan 1990). Since then knowledge of the birds of this region has improved considerably (Ash & Miskell 1998, Welch & Welch 1999, Ash & Atkins 2009, Jennings 2010, Porter & Aspinall 2010, Redman *et al* 2011, Porter & Suleiman 2013). See also the relevant country accounts in Fishpool & Evans (2001). It is clear that some of the birds that I considered then to be desert species are not *eg* the Rosy-patched Bush-shrike *Rhodophoneus cruentus* is almost as much an inhabitant of semi-arid areas. The present paper attempts to update the list of desert bird species that occur in this region, situated between the Sahara, East African desert and the interior desert of the Arabian peninsula.

THE RIFT VALLEY DESERT

The rift valley system of the gulf of Aden and southern Red sea region (Figure 1) is, except for higher altitudes and the waters themselves, lined largely by desert (which I define as the hyper-arid and arid regions of UNESCO 1979, Cowan 1997). The basic geological structure of the system has more recently been reviewed by Bosworth *et al* (2005) and its bioclimatology and phytogeography by Le Houérou (2003).

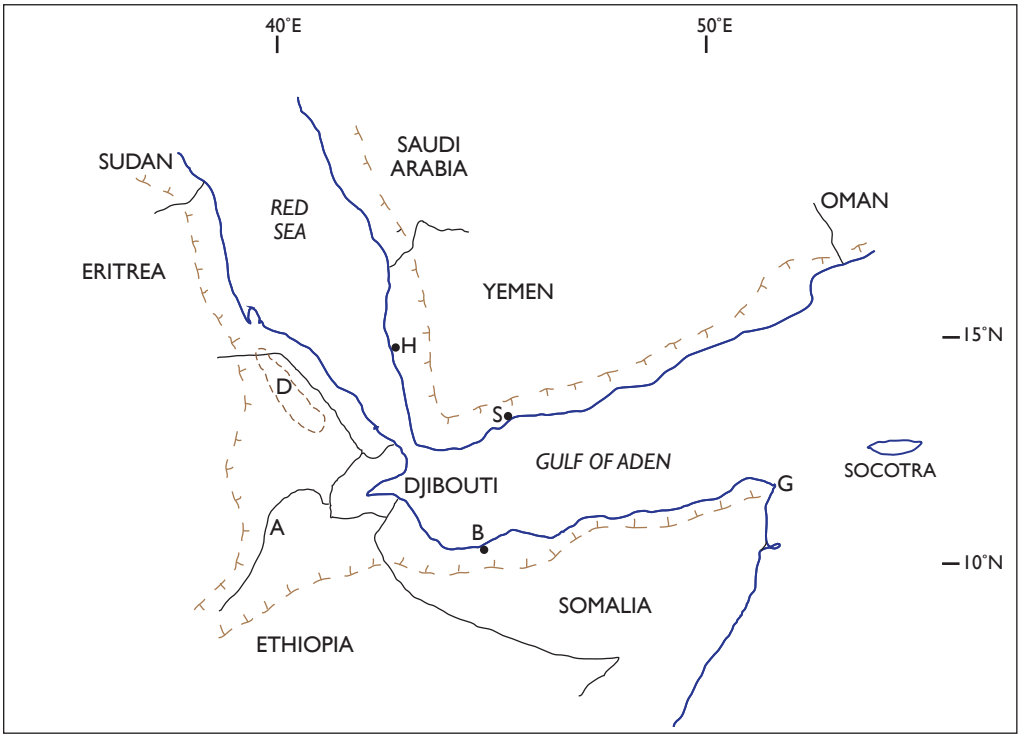

Figure 1. Gulf of Aden and southern Red sea rift valley system. A Awash river, B Berbera, D Danakil depression, G cape Guardafui, H Hudaydah, S Shaqra. The approximate position of the rift valley is indicated (see text).

South and west of the gulf of Aden and southern Red sea the rift valley desert is backed by the Ethiopian highlands and north Somalia mountains. The desert extends from the Sudan/Eritrea border at *c*18°N, an arbitrary cut-off point, through coastal Eritrea to Djibouti. In northeast Ethiopia the rift valley desert includes the Danakil desert and extends southwest almost to the entry of the Awash river into the Afar Triangle. Djibouti is mostly desert and desert extends along the north coast of Somalia to cape Guardafui re-emerging especially on the island of Socotra (Brown & Mies 2012) in the Yemeni Socotra archipelago. There are two areas of hyper-arid desert, in the Danakil depression and the northern coastal plain of Somalia east of Berbera. The rift valley desert south and west of the gulf of Aden and southern Red sea is connected to the Sahara via southern coastal Sudan and there are connections with the desert of the Somalia plateau (East African desert, which also includes the deserts of Kenya and southeast Ethiopia) through the north Somalia mountains. North and east of the gulf of Aden and southern Red sea, the rift valley desert is backed by the southern Asir mountains, Yemen highlands and the Jol uplands of the Hadhramaut. 18°N was taken to be the northern boundary of the rift valley desert in southwest Saudi Arabia. The desert extends through coastal Yemen to the mouth of the Red sea and then east to the coastal boundary with Oman at *c*53°E. The more coastal portion of the coastal plain of Yemen is hyper-arid desert, from about Hudaydah to Shaqra east of Aden. The interior desert of the Arabian peninsula abuts the rift valley desert in the Hadramaut.

DESERT BIRDS?

The definition of the term 'desert bird' is problematic (Cowan 1990, 1997). A basic dichotomy is between species that occur in the desert proper and those of oasis environments where oases include traditional oases, arable agricultural projects, cities and banks of rivers passing through the desert. Desert includes the normally dry valleys that experience stream flow only after sufficiently heavy rain. Some areas in oases appear effectively to be arid habitats. A bird species in the desert might be resident, wintering, on migration or have some other temporal status (Cowan 2006). The ideal ecogeographic definition of a desert bird would be a species completely restricted in its breeding and non-breeding range to deserts. More realistically, desert birds can be considered subjectively as those species which occur primarily within deserts, any occurrence elsewhere (*eg* in oases, semi-arid regions) being spatially and temporally considerably less important. A desert bird could breed in one desert, migrate with stop-overs in less-arid regions and overwinter in another desert. Characterization of an avian species as a desert bird requires a knowledge of its worldwide distribution and natural history. The implication is that these species have largely evolved in deserts and are therefore suitable for the elucidation of desert adaptations (*eg* Williams & Tieleman 2005). Presumably desert bird species *sensu stricto* are the most likely to possess significant desert adaptations though birds which migrate through desert regions (Miller 1963) and desert populations of more widespread species (*eg* Eagle Owl *Bubo bubo*, Great Grey Shrike *Lanius excubitor*, Mourning Wheatear *Oenanthe lugens*) might evolve desert adaptations.

The UNESCO (1979) map of the world distribution of arid regions is still, arguably, the most useful depiction of desert extent. A competitor is map 1.5 'Aridity zones' in Middleton & Thomas (1997). It is also based on aridity index data but limited to 1951–1980. It is reproduced on a smaller scale and does not show country boundaries. Though the extents of hyper-arid and arid zones for Africa appear similar to those of the UNESCO map they do not for Middle or central Asia.

RESULTS AND DISCUSSION

My new listing of the desert bird species of the rift valley desert of the gulf of Aden and southern Red sea region is presented in Table 1. Table 2 rearranges those species with resident populations in this region according to whether the populations are resident in the Arabian, African or both sections. Two species, Sand Partridge *Ammoperdix heyi* and Arabian Babbler *Turdoides squamiceps*, have resident populations only in the Arabian portion of the rift valley desert, seven are only resident in the African portion while six are resident in both. Ten of the species in Table 2 also have resident populations in the eastern Sahara and ten elsewhere in the Arabian peninsula. Seven species have resident populations in the East African desert. Heuglin's Bustard *Neotis heuglinii*, Little Brown Bustard *Eupodotis humilis*, Somali Pigeon *Columba oliviae* and Pale Prinia *Prinia somalica* are largely restricted to the African portion of the present desert and the East African desert.

Cowan (1990) gave examples of the occurrence of desert birds on the islands of the southern Red sea and gulf of Aden (see also Azeria 2004, Fernandes *et al* 2006, De Marchi

Table 1. Desert bird species of the rift valley desert of the gulf of Aden and southern Red sea region: status and distribution. R resident, NBV non-breeding visitor, rmp relatively minor part. Names of countries refer solely to mainland portions within the rift valley desert of the present paper. Scientific names (except of Houbara) and sequence follow Porter & Aspinall (2010). Scientific names of species not in the latter publication are from Redman *et al* (2011).

Species	Status and distribution
Sand Partridge *Ammoperdix heyi*	R: Yemen
Heuglin's Bustard *Neotis heuglinii*	R: Eritrea, Ethiopia (rmp), Djibouti, Somalia
Houbara *Chlamydotis undulata*[1]	NBV: Yemen
Little Brown Bustard *Eupodotis humilis*	R: Somalia
Cream-coloured Courser *Cursorius cursor*[2]	R: Socotra, Yemen (rmp). NBV: Eritrea, Djibouti, Somalia, Saudi Arabia and Yemen
Spotted Sandgrouse *Pterocles senegallus*	R: Eritrea, Ethiopia, Djibouti. NBV: Somalia
Lichtenstein's Sandgrouse *Pterocles lichtensteinii*	R: Eritrea, Ethiopia, Djibouti, Somalia, Socotra, Saudi Arabia, Yemen
Somali Pigeon *Columba oliviae*	R: Somalia
Egyptian Nightjar *Caprimulgus aegyptius*	NBV: rare
Brown-necked Raven *Corvus ruficollis*[3]	R: Eritrea, Socotra, Saudi Arabia, Yemen
Hoopoe Lark *Alaemon alaudipes*	R: Eritrea, Ethiopia, Djibouti (rmp), Somalia, Saudi Arabia, Yemen
Desert Lark *Ammomanes deserti*	R: Eritrea, Ethiopia, Djibouti, Somalia, Saudi Arabia, Yemen
Black-crowned Finch Lark *Eremopterix nigriceps*	R: throughout
Pale Prinia *Prinia somalica*	R: Ethiopia (rmp), Somalia
Arabian Babbler *Turdoides squamiceps*	R: Saudi Arabia, Yemen
Fulvous Babbler *Turdoides fulva*	R: Eritrea
Desert Warbler *Sylvia nana*[4]	NBV: throughout except Socotra
Desert Wheatear *Oenanthe deserti*	NBV: throughout
White-crowned Black Wheatear *Oenanthe leucopyga*	R: Eritrea, Ethiopia, Djibouti
Trumpeter Finch *Bucanetes githagineus*	NBV: Djibouti

[1]Includes *C. u. macqueenii* (Cowan 2004)

[2]Excludes *C. somalensis* (Pearson & Ash 1996)

[3]Excludes *C. edithae* (del Hoyo *et al* 2009)

[4]Includes *S. n. deserti* (del Hoyo *et al* 2006)

Table 2. Desert birds of the rift valley desert of the gulf of Aden and southern Red sea region: species with resident populations in the Arabian, African or both sections of the gulf of Aden and southern Red sea region rift valley desert. Letters after the species name indicate whether it also has resident populations in the eastern Sahara (S), the remainder of the Arabian peninsula (A) and the East African desert (E). The five species that are solely non-breeding visitors (Table 1) are omitted from the analysis.

Arabian
Sand Partridge (SA), Arabian Babbler (A)
African
Heuglin's Bustard (E), Little Brown Bustard (E), Spotted Sandgrouse (SA), Somali Pigeon (E), Pale Prinia (E), Fulvous Babbler (S), White-crowned Black Wheatear (SA)
Both
Cream-coloured Courser (SA), Lichtenstein's Sandgrouse (SAE), Brown-necked Raven (SA), Hoopoe Lark (SA), Desert Lark (SAE), Black-crowned Finch Lark (SAE)

et al 2009, Masseti 2010). Inspection of the distribution maps in Ash & Atkins (2009) for the Dahlak archipelago, which I have taken to be their distribution map squares 8a–d and 13a,b, reveals records of Cream-coloured Courser *Cursorius cursor*, Spotted Sandgrouse *Pterocles senegallus*, Brown-necked Raven *Corvus ruficollis*, Hoopoe Lark *Alaemon alaudipes*, Black-crowned Finch Lark *Eremopterix nigriceps* and Desert Wheatear *Oenanthe deserti*. Inspection of ABBA square HB10 (Jennings 2010), in the Farasan islands, shows breeding records for Brown-necked Raven (confirmed), Hoopoe Lark (probable) and Black-crowned Finch Lark (confirmed).

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Dr Peter Cowan, Department of Biological Sciences and Chemistry, University of Nizwa, PO Box 33, PC 616, Nizwa, Sultanate of Oman. desertmammal@yahoo.com