A survey for the Critically Endangered Liben Lark *Heteromirafra archeri* in Somaliland, north-western Somalia

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The Critically Endangered Archer’s Lark (*Heteromirafra archeri*) was formerly considered to be endemic to north-western Somalia and known only from the Tog Wajaale Plain, where 18 specimens were collected between 1918 and 1922. Fifteen visits between 1970 and 2008 failed to relocate the species there, although populations are now known from adjacent Ethiopia. We conducted three days of intensive surveys on the Tog Wajaale Plain in May 2010. Despite the three other lark species present being in full display, and *H. archeri* being recorded to have bred in early June, no Liben Larks were found. Vegetation structure surveys indicated that the plain has a taller and denser growth of grass than either of the other known localities for Liben Lark (the Liben and Jijiga Plains) making Tog Wajaale Plain seem superficially more suitable for the species, which prefers areas of taller grass elsewhere. However, previous large-scale agricultural activities may have altered the composition of grass species and precipitated the observed invasion of exotic weeds, notably *Parthenium hysterophorus*. Importantly, the Tog Wajaale Plain has a greater density of bushes than either the Liben or Jijiga Plains, possibly making ground-nesting birds more susceptible to predation by perch hunters.

**Keywords:** Archer’s Lark, *Heteromirafra archeri*, grassland, habitat degradation, *Parthenium hysterophorus*, Somalia

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Prior to recent work reported in Spottiswoode et al. (2013), Archer’s Lark *Heteromirafra archeri* (now Liben Lark; hereafter *H. archeri* to avoid confusion) was known only from 18 specimens collected by Geoffrey Archer on the Tog Wajaale Plain, Somaliland, north-western Somalia, between September 1918 and June 1922, where he described it as ‘quite numerous’ (Clark 1920; Archer and Godman 1961; Spottiswoode et al. 2013). Since then, the only report of it has been an unpublished sighting in 1955 by John Williams in ‘fairly open rocky country with scattered and sparse bush and limited grass cover’, 15–40 km north-west of Boorama, c. 100 km north-west of the Tog Wajaale Plain (JG Williams in litt. 1984, cited in Collar and Stuart 1985). Subsequent searches of this area have failed to reveal any sign of it, and taken together with the atypical habitat and complete lack of supporting evidence, this record has been discounted (e.g. J Miskell in litt. 2013). At the type locality, the Tog Wajaale Plain, 15 visits by John Ash and John Miskell between 1970 and 2008 failed to turn up any birds and found widespread habitat disturbance within its range (BirdLife International 2015).

In this study our aim was to conduct an intensive survey across the Tog Wajaale Plain in order to (1) attempt to find *H. archeri*, and (2) characterise the habitat following methods employed on the Liben and Jijiga Plains (Spottiswoode et al. 2009; Donald et al. 2010; Spottiswoode et al. 2013), such as to allow comparison with vegetation known to support *Heteromirafra* larks in southern and north-eastern Ethiopia, respectively.

The Tog Wajaale Plain (c. 9°40’ N, 43°21’ E) is situated along the Somaliland/Ethiopia frontier in north-western Somalia. It covers the region between the Wajaale River that forms the Somalia/Ethiopia border and two conspicuous hills to the north, Jifa Medir (9°42′47″ N, 43°16′44″ E) in the north-west and Jifa Uri (9°43′19″ N, 43°23′30″ E) in the north-east, located c. 11 km and 16 km north of the Wajaale River, respectively. The area between these hills and the Wajaale River is approximately 250 km². The plain lies between 1 525 m and 1 640 m altitude.

Three days were spent on the Tog Wajaale Plain by MLSM, CC and JF in May 2010. On 19 May they covered as much of the area as possible, mostly driving along...
vehicle tracks and stopping to walk wherever habitat looked suitable for Heteromirafra larks, based on their experience on the Liben Plain and the habitat of Rudd’s Lark H. ruddi in the South African montane grasslands. All observers were familiar with the vocalisations, plumage and behaviour of H. archeri in Ethiopia. They visited Jifa Medir, Jifa Uri and the Wajaale River, and as much area as possible in between, travelling c. 70 km in distance in order to identify the best areas for further survey. The mornings (sunrise to 10:30) of 29 and 30 May were spent walking straight-line transects through the least-transformed grasslands in search of H. archeri and to conduct vegetation structure surveys every 250 m (following Spottiswoode et al. 2009; Donald et al. 2010; Spottiswoode et al. 2013), walking a total of 4.90 km and 5.25 km on the two days, respectively. During the rest of these days, further explorations were made across c. 20 km of the area not previously covered, to search the plain as comprehensively as possible. During this time some basic interviews were made with local farmers and villagers as to previous agricultural activity in the area. The timing of the field visit coincided with the expected period of greatest display activity of H. archeri, immediately prior to breeding; seven active nests were found in early June 1922 (Archer and Godman 1961). All lark species present (Singing Bush Lark Mirafraca cantillans, Somali Short-toed Lark Calandrella somalica and Thekla Lark Galerida theklae) were in full display and song during the time. All other bird species observed were noted.

During our visit, no H. archeri were found. A total of 46 bird species was recorded (see Supplementary Appendix S1), including species typical of the Liben Plain in Ethiopia, such as Kori Bustard Ardeotis kori, White-bellied Bustard Eupodotis senegalensis, Black-winged Lapwing Vanellus melanopterus, Somali Courser Cursorius somalensis, Somali Fiscal Lanius somalicus, Somali Crow Corvus edithae, Somali Short-toed Lark, Ethiopian Swallow Hirundo aethiopica, Speke’s Weaver Ploceus spekei and Plain-backed Pipit Anthus leucopryus (Spottiswoode et al. 2010).

Vegetation surveys were conducted at 41 sample points spread at 250 m intervals along six transect lines. Data are presented in Supplementary Appendix S2. Basic analyses of these quantitative data were made to compare the vegetation on the Tog Wajaale Plain with that of the Jijiga and Liben Plains (summarised in Table 1). We emphasise that the surveys on the Tog Wajaale Plain were conducted during an exceptionally wet year (Food Security and Nutrition Analysis Unit 2010). This suggests that comparisons with the other two locations from which Heteromirafra larks have been recorded (the Jijiga and Liben Plains), surveyed in the same month the following year, should be treated with caution. With these caveats in mind, Kruskal–Wallis rank sum tests revealed significant differences between the three sites for all the variables we recorded (all \(P < 0.001\)). Notable differences between the Tog Wajaale Plain and the other two sites were as follows: of the three sites, the Tog Wajaale Plain had the lowest density of cowpats (which could either reflect lower grazing pressure, or decreased visibility owing to longer grass and increased decomposition arising from recent heavy rains) and had much the lowest proportional cover of bare ground and very short grass. Correspondingly, it had the highest proportional cover of the two longer grass categories. It also had the highest density of bushes (which were woody species and hence unrelated to the unusually high rainfall that year). Two conspicuous features of the Liben Plain, the presence of giant fennel Ferrula communis plants and large circular open areas formed by nests of the harvester ant Messor cephalotes (Spottiswoode et al. 2009), were absent from both the Tog Wajaale and Jijiga Plains.

Although it was beyond our capability to do a comprehensive vegetation survey, almost all the plant species that we encountered and were able to identify are associated with soil disturbance. In particular, the plain was extensively invaded by the American weed Parthenium hysterophorus, a well-established and economically deleterious invasive species in north-eastern Africa (Nigatu et al. 2010; McConnachie et al. 2011), as it is elsewhere in Africa, Asia and Australia. In some of our transects, this weed was dominant in thick, waist-high patches, whereas in

**Table 1:** Comparison of vegetation and land-use traits between the three sites from which Heteromirafra larks have been or are currently known in the Horn of Africa, as counted along transects at 250 m intervals, following Spottiswoode et al. (2009) and Donald et al. (2010). Within a 25 m radius of a central point, trees were counted. Within each of two subplots of 5 m radius, the number of bushes and cowpats were counted, the proportion cover of bare ground was estimated, and the percentage contribution to grass cover of each of four categories of grass height was estimated. Data are medians (ranges). Please see main text for cautionary comments.

|                      | Tog Wajaale Plain (May 2010) | Jijiga Plain (May 2011) | Liben Plain (May 2011) |
|----------------------|-----------------------------|------------------------|------------------------|
| No. sampling points  | 40                          | 72                     | 205                    |
| Trees                | 0 (0)                       | 0 (0–1)                | 0 (0–76)               |
| Bushes               | 0.2 (0–1.2)                 | 0 (0–7.5)              | 0 (0–30)               |
| Cowpats              | 0 (0–1.9)                   | 0 (0–3)                | 2 (0–12)               |
| Bare ground (%)      | 10 (0–90)                   | 57.5 (2.5–100)         | 55 (5–95)              |
| Grass <5 cm (%)      | 50 (5–100)                  | 95 (0–100)             | 65 (5–97.5)            |
| Grass 5–15 cm (%)    | 28.8 (0–80)                 | 2.5 (0–22.5)           | 32.5 (2.5–100)         |
| Grass 15–40 cm (%)   | 15.0 (0–45)                 | 0 (0–7.5)              | 0 (0–30)               |
| Grass >40 cm (%)     | 0 (0–50)                    | 0 (0)                  | 0 (0–10)               |

* On the Tog Wajaale Plain the number of bushes and cowpats were instead counted per 25 m radius plot in the field, but were converted here to being expressed per unit area represented by a 5 m radius plot.
others the seedlings were only beginning to germinate and could easily have been under-recorded among the grasses. Other conspicuous invasive weed species recorded were Solanum eleagnifolium, Hibiscus trionum, Datura stramonium and Flaveria bidentis. A number of grasses were not identified but common grasses we encountered, which occur predominantly in disturbed areas elsewhere in Africa, were Tragus berteronianus, Aristida adscensionis, Chloris pycnothrix and Bothriochloa insculpta (van Oudtshoorn 2012). Both isolated bushes and large clumps of Acacia etbaica (Vachellia etbaica), which was dominant in the surrounding area, are invading the plain, especially on disturbed soil.

The entire extent of the Tog Wajaale Plain has been used for arable agriculture at different times since the 1950s, as corroborated by interviews of five residents of the plain, our own observations and reports of large-scale agricultural schemes for wheat, sorghum, millet and maize and associated ploughing (Ash and Miskell 1998). In addition, several hundred cattle and some goats, sheep and camels were observed grazing the plain, but no native grazing mammals were observed.

While the extinction of *H. archeri* on the Tog Wajaale Plain is hard to prove, our failure to find this species during our deliberately timed visit and the previous 15 failed attempts by Ash and Miskell (BirdLife International 2015) makes it highly probable that this is the case. We feel that further searches on the Somali side of the border are unlikely to bring positive results, although similar-looking habitat across the border in Ethiopia may be worth investigating as it would have been subject to a different sociopolitical history. Even here, however, satellite imagery from Google Earth suggests widespread human impacts on the habitat.

The most probable cause of the observed extinction of *H. archeri* on the Tog Wajaale Plain, or at least a major decline in its population here, is habitat change associated with agricultural activity. Higher and denser grass growth on the Tog Wajaale Plain compared with the Liben and Jijiga Plains may superficially appear to make the Tog Wajaale Plain more suitable for *H. archeri*, which favours areas of taller grass on the Liben and Jijiga Plains (Spottiswoode et al. 2009; Donald et al. 2010; Spottiswoode et al. 2013) and possesses a long hind claw associated with species that prefer denser grass to open ground (Green et al. 2008). The height of the grass probably resulted from particularly high rainfall in 2010, together with a lower density of grazing mammals, as evidenced by fewer cowpats compared to the Liben and Jijiga Plains. However, extensive invasion of the grasslands by exotic weed species and likely changes in grass species composition, as evidenced by a preponderance of grass species associated with disturbance, appear to have made the habitat unsuitable. Furthermore, the Tog Wajaale Plain has a greater density of trees and bushes compared with the Jijiga and Liben Plains (and contrasting with Archer’s original description of it as ‘open meadowland’; Archer and Godman 1937), perhaps facilitated by soil disturbance from ploughing. This is particularly relevant since some ground-nesting birds, such as Skylark *Alauda arvensis*, avoid nesting in fields with tall boundaries (Donald et al. 2001). This is thought to be an anti-predator response, since elevated perches such as fence lines, bushes and trees may increase predation risk, and predation risk has been demonstrated to influence habitat selection of birds breeding in open habitats (Suonen and others 1994).

Fortunately, a new population of *H. archeri* has been found on the Jijiga Plain of Ethiopia, c. 50 km south-west of the Tog Wajaale Plain, and is now known to belong to the same taxon as the birds collected by Archer on the Tog Wajaale Plain (Spottiswoode et al. 2013). Moreover, both populations appear to be conspecific with the Liben Lark (Spottiswoode et al. 2013). While this at least means that the taxon is not extinct, it is still known only from two very small and isolated populations where intensive human land use is causing habitat degradation, putting it at high risk of extinction. The proliferation of the alien invasive plant *Parthenium hysterophorus* needs to be monitored closely as it is invading large areas of the remaining grasslands at the Tog Wajaale Plain. If it spreads to the species’ last remaining populations on the Jijiga and Liben Plains, it may compound the severe threats (overgrazing, bush encroachment and agricultural expansion) that *H. archeri* is already facing there. Early detection of *Parthenium* and developing effective methods to control it may play an important role in the future conservation of the species.

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