A review of the status, distribution and ecology of Friedmann's Lark Mirafra pulpa, including its habitat associations

Author: Bradley, James

Source: Bulletin of the British Ornithologists' Club, 140(1) : 38-46

Published By: British Ornithologists' Club

URL: https://doi.org/10.25226/bboc.v140i1.2020.a4

A review of the status, distribution and ecology of Friedmann's Lark *Mirafra pulpa*, including its habitat associations

by James Bradley

Received 8 August 2019; revised 29 January 2020; published 19 March 2020

http://zoobank.org/urn:lsid:zoobank.org:pub:8C83B612-7B6E-429E-8BB4-BF60E2205AAA

Summary.—Friedmann's Lark *Mirafra pulpa* is a poorly known species endemic to East African savannas, and classified as Data Deficient by BirdLife International. In light of our limited knowledge, I reviewed the species' ecology, status and distribution, finding no more than 51 dated records (or discrete periods of occurrence) in a search of the literature and internet databases. However, the restriction of these records to two distinctive regions of the Chyulu and Nyambeni foothills suggests that Friedmann's Lark may be closely tied to pockets of ash-based soil associated with geologically recent volcanic formations. These gritty, white-coloured soils are characterised by slower drainage in contrast to the region's otherwise widely occurring red soils, and retain year-round the dense grass cover apparently preferred by *M. pulpa*. It is therefore likely to be the distribution of these ash-based soils and associated dense grassland that determines the distribution of Friedmann's Lark. Based on this hypothesis, and the species' well-known erratic occurrence, its year-round area of occupancy may amount to no more than 20% of its overall extent of occurrence, amounting to *c*.5,000 km^2, potentially qualifying Friedmann's Lark as Near Threatened under IUCN criteria.

Following the discovery of Friedmann's Lark in 1912 (Friedmann 1930a), and a gap of five decades before the species was encountered again, basic knowledge of the species began to improve between the 1970s and 1990s, when it was found on several occasions in the Tsavo area of southern Kenya (Lack 1977, Pearson *et al*. 1992, Zimmerman *et al*. 1996). Subsequently, it has been reconfirmed to occur in the Shaba area of central Kenya, close to where specimens were collected in 1912 (Friedmann 1930b, Records Sub-committee 2002), yet numbers appear to be small, and several key questions concerning the species' precise habitat requirements and breeding ecology remain unanswered. Because of these fundamental shortfalls, no threat category has been assigned to the species to date, and it remains in the 'holding category' Data Deficient (Butchart 2007, BirdLife International 2020).

Complicating an assessment of the species' ecology and conservation needs, Friedmann's Lark is a notoriously cryptic species. It tends to sing during only a few wet months of the year, while its occurrence at even better-known sites is frequently erratic. Although its song is very distinctive, the species' morphological similarity to Singing Bushlark *M. cantillans* has commonly posed identification problems in the past (Lack 1977, 1992).

However, following the publication of accurate field guides in the late 1990s and early 2000s, and with now easily accessible audio material, knowledge of the species among field observers has improved significantly in the last two decades. This has resulted in a slowly growing number of records, and permits a closer review of the species' ecology and status than was previously possible. A question of particular importance, on which I seek to shed

ISSN-2513-9894 (Online)

some light here, concerns the factors behind the patchy distribution and specific habitat requirements of Friedmann's Lark, and the seasonality of its occurrence.

Status and distribution

Friedmann's Lark is known only from southern Ethiopia, and central Kenya south to northern Tanzania (Lack 1992). Knowledge of the species' ecology was well summarised by Lewis & Pomeroy (1989), who considered it to be an obscure inhabitant of bushed grasslands, seen during sporadic influxes associated with rains, and also, at least locally, a nocturnal migrant (Pearson *et al*. 1992). Areas of repeated occurrence, supported by both historic and / or recent records, include the following.

(1) Archer's Post and the adjacent Buffalo Springs and Shaba National Reserves in north-central Kenya (Friedmann 1930b, Records Sub-committee 2002, Borrow 2010), covering an area of *c*.1,500 km^2. Reports are almost exclusively in April–May, but also in August and November. Juvenile specimens taken in May 1912 (Lewis & Pomeroy 1989; Appendix 1), are thought by some to perhaps involve same-age Singing Bushlarks *M. cantillans* (P. A. Donald *in litt*. 2019), but otherwise represent the only breeding data for the species.

(2) The Tsavo region of southern Kenya, extending south into northern Tanzania (Lack 1977, Pearson *et al*. 1992, Zimmerman *et al*. 1996; N. Baker *in litt*. 2019, B. Finch *in litt*. 2019), and covering approximately 23,500 km^2. Within this broader range, the few regularly frequented areas (>3 records) include the plains north-east of Kilaguni Lodge in Tsavo West National Park, the western part of Tsavo East National Park, the Taita Hills lowlands including the Maktau area and Rukinga Ranch, and Mkomazi Game Reserve in northern Tanzania. A small number of records immediately south-west of the Pare Mountains, in northern Tanzania, mark the southern limit of the range. Most reports from these areas are in April–May and November–January, supplemented by scattered dry-season records in February–March and August–September.

Aside from these two regions, wanderers (presumably from the Tsavo population) have been found at several places. The type specimen (Friedmann 1930a), collected at the Sagan River in southern Ethiopia in May 1912, and the sole record from that country (Ash & Atkins 2009), is generally believed to have involved a wanderer. North-east of Tsavo West National Park, wandering birds were found at Kiboko in the 1960s and 1970s (Lewis & Pomeroy 1989; audio recording by M. North), while Zimmerman *et al*. (1996) mentioned a record at nearby Kibwezi, although the date is unknown. Reports of the species from the northern Kenya Rift Valley, at Kapedo and in the Ilemi Triangle in the 1980s, are now thought to be erroneous based on a reappraisal by the original observer (Lack 1992; P. Lack *in litt*. 2019). Consequently, the two areas detailed above encompass the sole regularly known distribution of Friedmann's' Lark. Where known, coordinates of records are provided in the Gazetteer.

The two areas inhabited by this lark are characterised by an arid-semiarid, bimodal rainfall regime, with annual rainfall amounting to 250–1,000 mm, falling primarily in March–May and October–December (Brown & Britton 1980, Lewis & Pomeroy 1989). Although records during the dry months are very few (Fig. 1b), and the species is also sometimes unrecorded for several consecutive years (Fig 1a), Friedmann's Lark may undergo mass breeding and irruptive dispersal events during and following good rains, such as those preceding December–January occurrence in well-grassed areas of Tsavo East National Park (Lack *et al*. 1980). It has been found in good numbers on rare occasions during particularly suitable rainfall conditions (e.g., Pearson *et al*. 1992). However, this

ISSN-2513-9894 (Online)

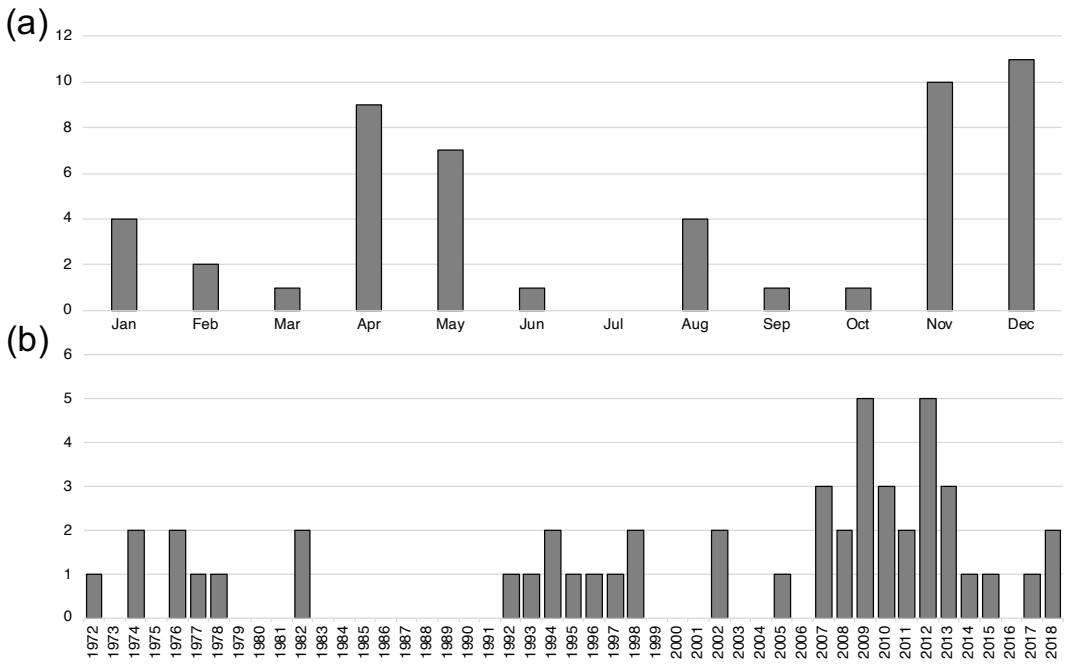

Figure 1(a) Monthly (1912–2018) and (b) annual (since 1972) summaries of Friedmann's Lark *Mirafra pulpa* records.

sporadic abundance has yet to be studied in detail, and its breeding ecology is wholly unknown (Ryan & Sharpe 2019). With no repeat occurrences of the 100+ birds observed in Tsavo East in December 1992 (Pearson *et al*. 1992), and the whereabouts of most individuals when not singing during the rains being largely unknown (Lack 1977, Borrow 2010), it appears that Friedmann's Lark is genuinely rare. The absence of records from the well-watched Buffalo Springs / Shaba areas, between the specimens collected there in 1912 and its rediscovery in May 2002 (Records Sub-committee 2002), which itself could have involved local extirpation followed by re-colonisation, suggests a precarious existence for the species in that area.

While this lark has been described as 'seasonally uncommon' (Lack *et al*. 1980, Lack 1985), it is otherwise known from some 51 dated records or discrete periods of occurrence, as determined by my personal communications with field observers, a search for literature records, and a review of reports in online databases and digital media platforms (e.g., eBird, iNaturalist, The British Library of Sounds, xeno-canto.org, the Macaulay Library, Surfbirds.com, bird tour company trip reports, and YouTube). All but eight records are from Kenya, and there are just seven specimens, and 20 records documented by in-hand examination, video, photographs or audio recordings. Another 26 records regarded here as reliable are based on sight records by experienced observers familiar with the species (Appendix 1). Numbers reported since Pearson *et al*. (1992), primarily during suitably wet conditions, have never exceeded ten singing males and in most cases, involved only 2–4 or 'several' singing birds. Numbers are likely to be considerably lower during years of (presumably) suboptimal conditions when the species is not reported at all (e.g., 1999–2001 and 2003–04; Fig. 1a).

ISSN-2513-9894 (Online)

Habitat associations

Vegetation communities typically frequented by Friedmann's Lark include particularly dense grassland up to 1 m tall with some bare ground, and a range of woody shrubs covering 2–8% (Lack 1977, Pearson *et al*. 1992). Areas that have recently burned may also be favoured (Pearson *et al*. 1992) but sites where dense grass cover dies back and thins out during the dry months, such as in parts of Tsavo East National Park, are not thought to be occupied year-round (Lack *et al*. 1980, Lack 1997). A few records in the dry months of February and August–September at Lake Jipe, Mkomazi Game Reserve and Shaba National Reserve, however, suggest probable year-round presence in at least some areas. At these sites, immediately adjacent to major highland areas with relatively high annual rainfall, locally moist conditions may permit suitably dense grass cover to persist throughout the year. The importance of dense grassland is echoed by Lack (1977) who noted a preference for the western side of Tsavo East National Park, which is wetter and more densely grassed than the east. Behaviours noted in the field include a tendency to sing from bushed

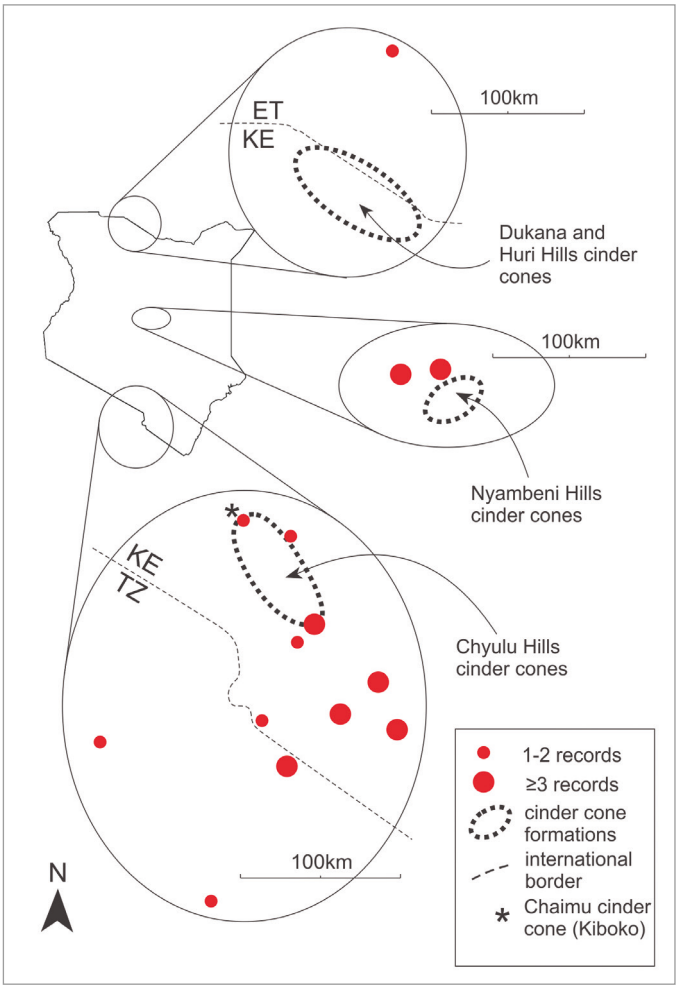

Figure 2. Spatial distribution of records of Friedmann's Lark *Mirafra pulpa* records in relation to the cinder-cone formations of the Dukana / Huri Hills in Kenya (KE) and Ethiopia (ET), and the Nyambeni and Chyulu Hills in Kenya. Records extend to Tanzania (TZ).

ISSN-2513-9894
(Online)

Figure 3. Satellite imagery (© Google Earth) showing the denser grassland and poorer drainage (evidenced by abundant water pans) that characterise white ash-based soils (right side) in comparison to red soils (left side) in the Kilaguni Lodge area of Tsavo West National Park (Kenya).

grassland on low ridges (B. Finch *in litt*. 2019), while all sites of regular occurrence are at elevations between 500 and 1,100 m (up to a max. of 1,400 m).

A possibly important observation not yet made with respect to the distribution of some favoured areas, relates to the soils at these sites and their proximity to recent volcanic activity. A review of the wider geography of the two regions regularly frequented by Friedmann's Lark shows these areas to be immediately adjacent to volcanic cinder-cone formations. At both the southern end of the Chyulu Hills and the Nyambeni Hills, basaltic cinder cones date from the late Pleistocene to Holocene, with some eruptions recorded in the Chyulu Hills as recently as the 19th century (Hackman *et al*. 1989, Haug & Strecker 1995). Cinder cones are indicative of light pyroclastic lava that commonly forms ash deposits, which give rise to distinctive soils. The Tsavo region, and areas south to Mkomazi Game Reserve, are within reach of ash falls from the cinder cones of the southern Chyulu Hills, and the Buffalo Springs-Shaba region is only a short distance north of the cinder cone formations of the Nyambeni Hills (Fig. 2).

In both these areas, soils on which the densest grassland habitat forms are commonly gritty and whitish in colour, sometimes found on low ridges, and probably formed from ash ejected by the nearby cinder cones. Such volcanic ash-based soils appear to have unique drainage characteristics, retaining sufficient moisture during dry periods to permit the formation of dense grassland year-round. Satellite imagery showing dense grassy cover on white soils vs. red soils, with the former also characterised by abundant water pans (Fig. 3), supports this theory. In Kenya, such white volcanic ash-based soils and their associated grassland type are apparently restricted to the environs of these two ranges of hills.

Discussion and Conclusions

While Williams's Lark *M. williamsi* is well known to favour weathered lava-based soils in Kenya (Zimmerman *et al*. 1996), an association with volcanic soils has not previously been suggested for Friedmann's Lark. Such a habitat specialisation, related to the distribution

ISSN-2513-9894 (Online)

of a particular type of ash deposit (vs. lava), may help to explain this species' puzzling distribution. While there are records of Friedmann's Lark from soil types other than ash-based soils, this appears to be the case only after heavy rains result in a fresh cover of dense grassland on other soils (e.g., December–February in Tsavo East National Park; Lack 1985). As grassland on soils other than those formed from ash thins out during the dry season, these areas apparently become unsuitable for the species, with for example only *M. cantillans* recorded with certainty on the red soils of Tsavo East National Park in May–November (Lack 1985). It seems possible that during these dry periods, birds retreat to areas closer to the cinder-cone formations, where ash-based soils and associated dense grassland are more abundant. In this context, the distribution of this soil-grassland association would comprise the core of the species' range, and while *M. pulpa* may disperse nocturnally into nearby dense grasslands on other soil types following adequate seasonal rains, it is unable to colonise them permanently because they do not offer sufficiently dense habitat year-round. Further supporting the view that grassland on ash-based soils is indeed the preferred habitat, and the source of seasonal dispersal, is the observation of more than 100 singing birds in a small area of white soils in the immediate vicinity of the southern Chyulu Hills, near Kilaguni, in the early 1990s (Pearson *et al*. 1992), as well as the 1965 record from Kiboko (Appendix 1), involving one or more birds singing on the flanks of the Chaimu cinder cone.

In light of my review, the global conservation status of Friedmann's Lark may warrant updating to reflect its small global distribution, intermittent occurrence, highly specialised habitat requirements within broader savanna ecosystems, and its apparently genuine rarity. While there are still no robust data from which to estimate population size, several observations outlined herein permit an assessment of extinction risk for Friedmann's Lark against other threat criteria which are geography-based (IUCN 2012). While the global extent of occurrence of Friedmann's Lark, based on two widely separated subpopulations, is large, the year-round area of occupancy within this range is undoubtedly considerably smaller. Within the regional extent of occurrence of both subpopulations, records are very patchily distributed and large areas appear to be either entirely unoccupied or used on only a seasonal or sporadic basis. Based on this, unoccupied areas may amount to <20% of the 25,000 km^2 identified as the regional extent of occurrence (see Status and Distribution), resulting in an area of occupancy that is unlikely to exceed 5,000 km^2. This figure approaches the 2,000 km^2 threshold for qualification as Vulnerable under criterion B2. As such, and given that regularly occupied sites (three or more records) number scarcely ten in total, Friedmann's Lark may merit the status Near Threatened. That changes in rainfall patterns related to climate change might adversely affect Friedmann's Lark within this small global range is also cause for concern. Coupled with predicted climatic stochasticity, such cyclical population dynamics as shown by the species could render it increasingly vulnerable to risk of extinction.

Targeted surveys and basic ecological knowledge are much needed for Friedmann's Lark, and should focus on: (1) estimates of population size in either or both of the known regions of occurrence, with a focus on documenting its breeding ecology and variation in population size related to rainfall, and (2) searches for Friedmann's Lark in other areas of potentially suitable habitat, especially in proximity to cinder-cone formations and ash-based soils associated with the Gregory Rift System, particularly during dry periods.

The latter include formations on the western slopes of the Huri Hills (03°36′35″N, 37°49′31″E), and the nearby Dukana Hills and Mega Basalt Field (04°00′00″N, 37°20′23″E). Both of these geological features are within 150 km of the type locality in southern Ethiopia, and should be surveyed following seasonal rains, both for the lark and to assess the

ISSN-2513-9894 (Online)

grassland habitat. Given that southern Ethiopia is some 500 km from the population in the Buffalo Springs / Shaba area, it is possible that an undiscovered population closer to southern Ethiopia might account for the type specimen, perhaps in the vicinity of the above-mentioned regions of remote northern Kenya.

Acknowledgements

I thank Brian Finch, Hans Matheve, Richard Bishop and Chege Kariuki for sharing their observations of Friedmann's Lark in the Tsavo, Taita–Rukinga and Shaba–Buffalo Springs areas, and Neil Baker for providing Tanzania Bird Atlas records from that country. I am grateful to Paul Donald, Lincoln Fishpool, Guy Kirwan and Peter Lack for very useful comments that significantly improved the paper.

References:

Ash, J. & Atkins, J. 2009. *Birds of Ethiopia and Eritrea*. Christopher Helm, London.

Backhurst, G. 1997. Ringing at Ngulia 1997/1998. *Kenya Birds* 6: 85–88.

BirdLife International. 2020. Species factsheet: *Mirafra pulpa*. http://www.birdlife.org (accessed on 22 January 2020).

Borrow, N. 2010. Photospot: Friedmann's Lark. *Bull. Afr. Bird Cl*. 17: 102–105.

Brown, L. H. & Britton, P. L. 1980. *The breeding seasons of East African birds*. E. Afr. Nat. Hist. Soc., Nairobi.

Butchart, S. 2007. Birds to find: a review of 'lost', obscure and poorly known African bird species. *Bull. Afr. Bird Cl*. 14: 139–157.

Friedmann, H. 1930a. A lark new to science from southern Ethiopia. *Occ. Pap. Boston Soc. Nat. Hist*. 5: 237–259.

Friedmann, H. 1930b. A lark new to science from north-central Kenya Colony. *Auk* 47: 418–419.

Hackman, B. D., Charsley, T. J., Kagasi, J., Key, R. M., Siambi, W. S. & Wilkinson, A. F. 1989. Geology of the Isiolo area. *Rep. Mines Geol. Dept. Kenya* 103: 1–88.

Haug, G. H. & Strecker, M. R. 1995. Volcano-tectonic evolution of the Chyulu Hills and implications for the regional stress field in Kenya. *Geology* 23: 165–168.

IUCN. 2012. IUCN Red List categories and criteria: version 3.1. Second edn. IUCN, Gland & Cambridge, UK.

Lack, P. C. 1977. The status of Friedmann's Bush-lark *Mirafra pulpa*. *Scopus* 1: 34–39.

Lack, P. C. 1985. The ecology of the land-birds of Tsavo East National Park, Kenya. *Scopus* 9: 57–96.

Lack, P. C. 1992. Friedmann's Lark *Mirafra pulpa*. Pp. 21–22 *in* Keith, S., Urban, E. K. & Fry, C. H. (eds.) *The birds of Africa*, vol. 4. Academic Press, London.

Lack, P. C. 1997. Friedmann's Lark *Mirafra pulpa*—an enigma. *Bull. Afr. Bird Cl*. 4: 132–134.

Lack, P. C., Leuthold, W. & Smeenk, C. 1980. Check-list of the birds of Tsavo East National Park, Kenya. *J. E. Afr. Nat. Hist. Soc. & Natl. Mus*. 170: 1–25.

Lewis, A. & Pomeroy, D. 1989. *Bird atlas of Kenya*. A. A. Balkema, Rotterdam.

Pearson, D. J. & Turner, D. A. 1998. Review of Kenya bird records 1992-1996. *Scopus* 20: 65–83.

Pearson, D. J., Rodwell, S. & Turner, D. A. 1992. Friedmann's Lark resurfaces in Tsavo. *Kenya Birds* 1(2): 43–44.

Records Sub-committee. 2002. Records. *Kenya Birds* 10: 33–43.

Ryan, P. & Sharpe, C. J. 2019. Friedmann's Lark (*Mirafra pulpa*). *In* del Hoyo, J., Elliott, A., Sargatal, J., Christie, D. A. & de Juana, E. (eds.) *Handbook of the birds of the world Alive*. Lynx Edicions, Barcelona (retrieved from https://www.hbw.com/node/57602 on 7 August 2019).

Turner, D. A. 1998. East African Rare Birds Committee report. *Scopus* 20: 84.

Turner, D. A. & Pearson, D. J. 1983. East Africa bird report 1982. *Scopus* 6: 111–128.

Turner, D. A., Britton, P. L. & Pearson, D. J. 1978. Species report; Ethiopian section. *Scopus* 2: 107–125.

Zimmerman, D. A., Turner, D. A. & Pearson, D. J. 1996. *Birds of Kenya and northern Tanzania*. Christopher Helm, London.

Address: 7961 East Saanich Road, Saanichton, British Columbia, Canada, V8M 1T4, e-mail: james_bradley@ymail.com

Appendix: List of dated records of Friedmann's Lark *Mirafra pulpa* (NMK = National Museum of Kenya, Nairobi, reg. no., USNM = US National Museum, Smithsonian Institution, Washington DC, reg. no., BLS = British Library of Sound recording no., IBC = Internet Bird Collection media no., ML = Macaulay Library media no., XC = Xeno-canto recording no., iNat = iNaturalist media no.). NP = National Park; NR = Nature Reserve.

	Date	Observer	Country	Location	Documentation	Source
1	19 May 1912	E. Mearns	Ethiopia	Sagan River, Shoa	Type specimen	Friedmann (1930a); USNM 246241
2	2 Aug 1912	E. Mearns	Kenya	Archer's Post, Buffalo Springs NR	Specimens	Friedmann (1930b); USNM 246219, 246221, 246222

ISSN-2513-9894 (Online)

	Date	Observer	Country	Location	Documentation	Source
3	2 Apr 1965	M. North	Kenya	Chaimu Hill, Kiboko	Audio recording	ML 8044
4	2 Dec 1972	G. Backhurst	Kenya	Ngulia Lodge, Tsavo West NP	Specimen	Lack (1977); NMK 16142
5	8 Jun 1974	A. R. Gregory	Kenya	Kiboko	Audio recording	BLS 022M-WA03044X0031-0018V0
6	12 Nov 1974	D. Pearson	Kenya	Ngulia Lodge, Tsavo West NP	Specimen	Lack (1977); NMK 16143
7	30 Mar 1976	P. Lack	Kenya	Tsavo East NP	Sight record	Lack (1977)
8	16 Apr 1976	P. Lack	Kenya	Tsavo East NP	Sight record	Lack (1977)
9	4 Jan 1977	P. Lack	Kenya	near Voi Safari Lodge, Tsavo East NP	Specimen	Lack (1977); NMK 16144
10	29 Nov 1978	D. Pearson	Kenya	Ngulia Lodge, Tsavo West NP	Ringed	Turner *et al*. (1978)
11	15 Aug 1982	D. Turner	Kenya	Lake Jipe, Tsavo West NP	Sight record	Turner & Pearson (1983)
12	2 Dec 1992	D. Pearson	Kenya	12 km NE of Kilaguni Lodge, Tsavo West NP	Audio recording	Pearson & Turner (1998)
13	4 Dec 1993	Ngulia Ringers	Kenya	Ngulia Lodge, Tsavo West NP	Ringed	Pearson & Turner (1998)
14	19 Sep 1994	N. Baker	Tanzania	Mkomazi Game Reserve	Photograph	Turner (1998)
15	1994 (Nov)	N. Baker	Tanzania	Mkomazi Game Reserve	Sight record	Tanzania Bird Atlas unpubl. data
16	1995 (Dec)	P. Lack	Tanzania	Mkomazi Game Reserve	Sight record	Turner (1998)
17	1996 (Jan)	P. Lack	Tanzania	Mkomazi Game Reserve	Sight record	Tanzania Bird Atlas unpubl. data
18	1997 (Dec)	G. Backhurst	Kenya	35 km west of Ngulia Lodge, Tsavo West NP	Sight record	Backhurst (1997)
19	4 Feb 1998	D. Fisher	Kenya	Lake Jipe Lodge area, Tsavo West NP	Audio recording	BLS W1CDR0000788 (available offline only)
20	1998 (Aug)	N. Baker	Tanzania	Terat	Sight record	Tanzania Bird Atlas unpubl. data
21	29 May 2002	C. Jackson	Kenya	Shaba NR	Sight record	Records Sub-committee (2002)
22	2002 (Oct)	B. Finch	Kenya	Rukinga Ranch, 40 km SSW of Voi	Sight record	Records Sub-committee (2002)
23	18 Dec 2005	R. Bishop	Kenya	3.5k m SW of Kilaguni Lodge, Tsavo West NP	Sight record	pers. comm.
24	22 Apr 2007	B. Finch	Kenya	Shaba NR	Sight record	pers. comm.
25	15 Aug 2007	B. Finch	Kenya	Shaba NR	Photograph	pers. comm.
26	7 Nov 2007	B. Finch	Kenya	Buffalo Springs NR	Video	pers. comm.
27	3 Nov 2008	N. Borrow	Kenya	Shaba NR	Photograph	Borrow (2010)
28	1 Dec 2008	B. Finch	Kenya	Salt Lick Lodge, Maktau, Tsavo West NP	Sight record	pers. comm.
29	6 Apr 2009	C. Kariuki	Kenya	Maktau Gate area, Tsavo West NP	Sight record	pers. comm.
30	15 Apr 2009	B. Finch	Kenya	Shaba NR	Sight record	pers. comm.
31	11 May 2009	B. Finch	Kenya	Shaba NR	Sight record	pers. comm.
32	28 Nov 2009	A. Smets	Kenya	Tsavo East NP	Photograph	Borrow (2010)
33	15 Dec 2009	A. Jacot	Kenya	Kilaguni Lodge area, Tsavo West NP	Video	https://www.youtube.com/watch?v=J_rKiWE8ESk
34	2 May 2010	C. Davies	Kenya	Shaba NR	Audio recording	XC 57940

ISSN-2513-9894 (Online)

	Date	Observer	Country	Location	Documentation	Source
35	20 May 2010	C. Kariuki	Kenya	Shaba NR	Sight record	pers. comm.
36	19 Nov 2010	B. Finch	Kenya	Kilaguni Lodge area, Tsavo West NP	Sight record	pers. comm.
37	2011 (Apr)	B. Finch	Kenya	Maktau Gate area, Tsavo West NP	Sight record	pers. comm.
38	2011 (Nov)	N. Borrow	Kenya	Buffalo Springs NR	Photograph	Surfbirds Gallery
39	2012 (Jan)	H. Matheve	Kenya	Rukinga Ranch, 40 km SSW of Voi	Sight record	pers. comm.
40	7 Apr 2012	B. Finch	Kenya	Kilaguni Lodge area, Tsavo West NP	Sight record	pers. comm.
41	28 Apr 2012	M. Lilje	Kenya	Shaba NR	Photograph	iNat 7131884
42	2012 (Nov)	P. Morris	Kenya	Buffalo Springs NR	Sight record	Birdquest trip report
43	23 Dec 2012	N. Baker	Tanzania	Kitwai Plains	Sight record	Tanzania Bird Atlas unpubl. data
44	1 Jan 2013	C. Kariuki	Kenya	Rukinga Ranch, 40 km SSW of Voi	Sight record	pers. comm.
45	7 Feb 2013	N. Baker	Tanzania	Kitwai Plains	Sight record	Tanzania Bird Atlas unpubl. data
46	2013 (May)	A. Scott Kennedy	Kenya	Kilaguni Lodge area, Tsavo West NP	Photograph	Surfbirds Gallery
47	15 Dec 2014	L. Petersson	Kenya	Tsavo East NP	Photograph	IBC 1311265
48	3 Dec 2015	C. Kariuki	Kenya	Rukinga Ranch, 40 km SSW of Voi	Sight record	pers. comm.
49	24 Nov 2017	M. Cade	Kenya	Kilaguni Lodge area, Tsavo West NP	Video	https://www.youtube.com/watch?v=RoqH_4xBF1I
50	17 Apr 2018	M. Grant	Kenya	Buffalo Springs NR	Photograph	ML 108545821
51	18 May 2018	D. Bormann	Kenya	Buffalo Springs NR	Photograph	ML 102482451

Gazetteer

Site	Locality	Coordinates
Ethiopia	Sagan River, Shoa	05°02.827′N, 37°42.042′E
Kenya	12 km NE of Kilaguni Lodge, Tsavo West NP	02°49.778′S, 38°08.000′E
Kenya	3.5 km SW of Kilaguni Lodge, Tsavo West NP	02°56.153′S, 38°02.912′E
Kenya	35 km W of Ngulia Lodge, Tsavo West NP	03°05.520′S, 37°54.477′E
Kenya	Archer's Post, Buffalo Springs NR	00°37.395′N, 37°40.306′E
Kenya	Buffalo Springs NR	00°33.107′N, 37°37.001′E
Kenya	Chaimu Hill, Kiboko	02°15.431′S, 37°43.273′E
Kenya	Kilaguni area, Tsavo West NP	02°55.609′S, 38°03.609′E
Kenya	Lake Jipe Lodge area, Tsavo West NP	03°36.041′S, 37°46.960′E
Kenya	Maktau Gate area, Tsavo West NP	03°24.420′S, 38°07.112′E
Kenya	near Voi Safari Lodge, Tsavo East NP	03°20.619′S, 38°33.520′E
Kenya	Ngulia Lodge, Tsavo West NP	03°00.823′S, 38°12.642′E
Kenya	Rukinga Ranch, 40 km SSW of Voi	03°45.312′S, 38°29.645′E
Kenya	Salt Lick Lodge, Maktau, Tsavo West NP	03°32.804′S, 38°12.936′E
Kenya	Shaba NR	00°38.433′N, 37°55.937′E
Kenya	Tsavo East NP	03°13.356′S, 38°38.254′E
Tanzania	Kitwai Plains	04°54.038′S, 37°34.545′E
Tanzania	Mkomazi Game Reserve	03°58.132′S, 38°00.490′E
Tanzania	Terat	03°55.879′S, 36°34.051′E

ISSN-2513-9894 (Online)