

# Unravelling the mystery of the Mt Mulligan ‘mystery call’: analysis of a reported record of a Buff-breasted Button-quail vocalisation suggests misidentification with Painted Button-quail

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The Buff-breasted Button-quail *Turnix olivii* has not been definitively recorded since 1924. In 2017, Mathieson and Smith published details of a claimed sighting of the species near Mt Mulligan, north Queensland. These observers subsequently recorded and, in 2019, published details of a ‘mystery call’, a series of deep, booming vocalisations, which they suggested could be the first recordings of the vocalisations of a Buff-breasted Button-quail. In support of their claim, they presented three arguments: (1) the ‘mystery call’ is distinct from those of all other co-occurring species; (2) it fits the descriptions of the only known first-hand descriptions of the Buff-breasted Button-quail’s vocalisation, and (3) it was successfully used in call playback to attract a pair of Buff-breasted Button-quail. We examined the structure, frequency and temporally-based parameters of the ‘mystery call’ in comparison with descriptions of other button-quail vocalisations, namely those of Painted Button-quail *T. varius*, Red-backed button-quail *T. maculosus*, Little Button-quail *T. velox* and Chestnut-backed Button-quail *T. castanotus*. We found that the ‘mystery call’ falls within the variation documented for vocalisations of the Painted Button-quail. In addition, the ‘mystery call’ may be a poor match for the call of the Buff-breasted Button-quail based on interpretation of the only existing first-hand descriptions of that species’ vocalisation. Furthermore, we used the ‘mystery call’ extensively throughout north Queensland in call playback surveys and only the Painted Button-quail responded. Our evidence therefore suggests that the ‘mystery call’ is attributable to a Painted Button-quail and not a Buff-breasted Button-quail. Our findings raise doubts over the claimed sighting of a Buff-breasted Button-quail at Mt Mulligan.

**Keywords:** Buff-breasted Button-quail, Painted Button-quail, Turnix, threatened species, avian vocalisations

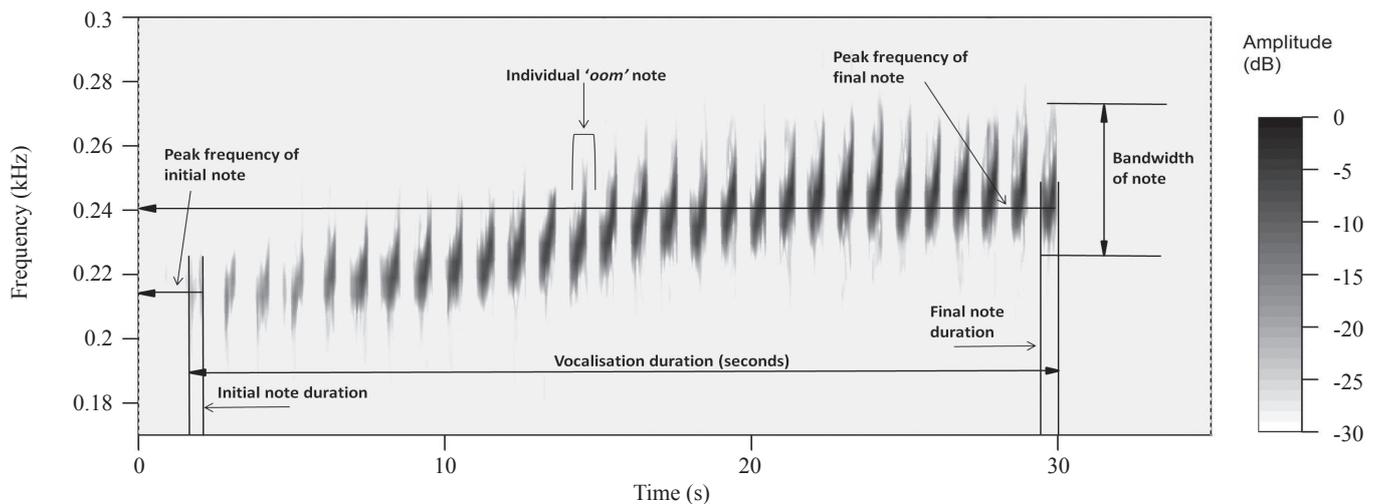
## INTRODUCTION

The Buff-breasted Button-quail *Turnix olivii*, a presumed extant inhabitant of Cape York Peninsula savanna ecosystems, is arguably the most poorly known and threatened bird species in Australia (Garnett *et al.* 2022; Webster *et al.* 2022). After its near absence from the scientific record for more than 60 years, the species was purportedly rediscovered just west of Cairns near Davies Creek in 1985 (Squire 1990). In the following decades, further anecdotal reports from this region of the Wet Tropics and Einasleigh Uplands (WTEU) in north Queensland suggested the existence of an extant population (Rogers 1995; Nielsen 2000, 2015; Chaplin 2011).

These anecdotal observations from well south of the species’ documented distribution (Macdonald 1971; Webster *et al.* 2022) have dominated the basis of our “understanding” of the species’ distribution and informed its conservation status (Marchant and Higgins 1993; Mathieson and Smith 2009; Garnett and Baker 2021). It is important to note at this juncture that there has been no irrefutable evidence produced to confirm a population of Buff-breasted Button-quail ever occurring in the WTEU (Webster 2022).

The details of one sighting of Buff-breasted Button-quail at Mt Mulligan in 2016 were published by Mathieson and Smith (2017). The site where the observation occurred is approximately 90 km west of Cairns in the Einasleigh Uplands

bioregion of north Queensland. The observation was made in open savanna on undulating hills dominated by *Eucalyptus tardecidens*. Smith and Mathieson (2019) also recorded a series of deep, booming ‘mystery calls’ (hereafter referred to as the ‘mystery call’) on automated recording units (ARUs) at the site where they had allegedly sighted a Buff-breasted Button-quail i.e. at Mt Mulligan. However, they could not definitely confirm that these calls originated from a Buff-breasted Button-quail. They argued that they were likely to be the first ever sound recordings of a Buff-breasted Button-quail, as no other sound recordings of this species apparently exist. Smith and Mathieson (2019, p. 29) used three lines of evidence to support this claim: (1) “the calls are mostly different to calls emitted by similar booming species that also inhabit the range of the Buff-breasted Button-quail”, (2) “these recordings fit the descriptions [of Buff-breasted Button-quail calls] given by McLennan (1923)”, and (3) “the behavioural response of Buff-breasted Button-quail to playback of the ‘mystery call’ was interpreted as a reaction to a perceived conspecific”. The authors presented sufficient evidence to persuasively discount the Papuan Frogmouth *Podargus papuensis*, Tawny Frogmouth *P. strigoides*, Common Bronzewing *Phaps chalcoptera*, Little Button-quail *T. velox* and Red-backed Button-quail *T. maculosus* as being responsible for the ‘mystery call’. Using the above lines of evidence, they presented the hypothesis that the ‘mystery call’ is sufficiently different from the calls of all other species of button-quail and therefore is likely to be attributable to a Buff-breasted Button-



**Figure 1.** Spectrogram of Painted Button-quail vocalisation displaying the temporal and frequency-based parameters that were measured for each vocalisation.

quail. Smith and Mathieson (2019) accept that the ‘mystery call’ shares some similarities with a limited set of recorded Painted Button-quail *T. varius* vocalisations and that there is some potential for confusion, although they undertook no statistical analysis to explore these similarities.

Confirmation of the existence of a contemporary population of Buff-breasted Button-quail would be extremely significant for the conservation of this species, as currently there are no known extant populations. Recordings of the species’ vocalisations would also be invaluable for use in call playback surveys and as a guide for the collection and analysis of audio data using ARUs. Given the significance of the claims of both an extant population of Buff-breasted Button-quail at Mt Mulligan and a recorded vocalisation from that site that is possibly attributable to the species (Smith and Mathieson 2017, 2019), a thorough assessment of the ‘mystery call’ and its potential confusion with the call of the Painted Button-quail is essential. Here we present an analysis of the ‘mystery call’ using both quantitative and qualitative comparisons. We used a reference collection of vocalisations of Painted Button-quail from north Queensland (Webster *et al.* 2023) for comparison with the ‘mystery call’ and performed extensive call playback surveys with the ‘mystery call’ across north Queensland. We also examined the diaries of William Rae McLennan (McLennan 1922), which contain the only first-hand accounts of the vocalisations of the Buff-breasted Button-quail, and compared these descriptions with the ‘mystery call’.

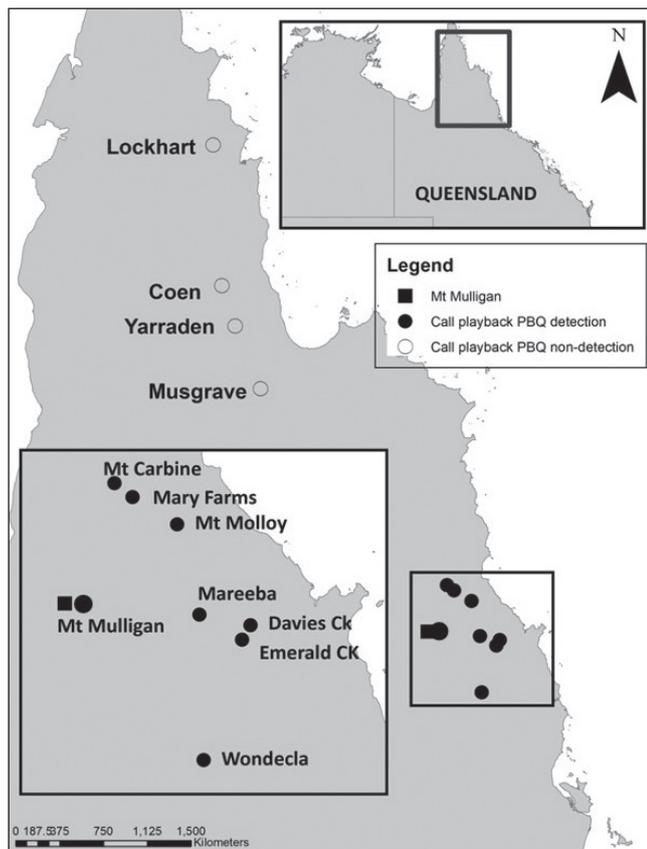
## METHODS

### *Descriptive and statistical analysis of calls*

Recordings of the 32 ‘mystery calls’ described by Smith and Mathieson (2019) were generously provided by these authors for the analyses reported here. However, two of these recorded ‘mystery calls’ were excluded from analysis, as they were identified as belonging to Common Bronzewing and Red-backed Button-quail based on comparisons of spectral and temporal parameters of confirmed vocalisations (Marchant and Higgins 1993; Webster unpubl. data.). A further six recordings were discarded as they either did not represent a full call

sequence or were very ‘weak’ as a result of the vocalising bird being distant from the ARU, meaning that the vocal parameters could not be measured accurately. We analysed the remaining 24 calls, and for comparison we used the vocalisations of Painted Button-quail ( $n = 55$ ) (Webster *et al.* 2023). The reference vocalisations of Painted Button-quail were obtained from sites throughout the WTEU bioregion of north Queensland, namely Mareeba Wetlands (S16.93°, E145.36°), Mount Molloy (16.71°, E145.35°), Davies Creek (S17.00° E145.57°), Emerald Creek (S17.06°, E145.54°), Wondecla (S17.46°, E145.41°) and Ravenshoe (S17.64°, E145.46°), as presented and described in Webster *et al.* (2023). Additionally, for statistical comparisons the vocalisations of Little Button-quail ( $n = 36$ ) recorded near Mt Isa, Red-backed Button-quail ( $n = 46$ ) recorded on central Cape York Peninsula and Chestnut-backed Button-quail ( $n = 33$ ) recorded from several sites throughout the species’ distribution across the Northern Territory and Western Australia (Webster *et al.* 2021) were used. All vocalisations were examined as spectrograms in Audacity (version 2.2.2; Audacity Team 2018). Eight vocal parameters were measured for each call sequence, representing both temporal and frequency-based parameters (Fig. 1). All these parameters, except the bandwidth of the final note, were also examined by Smith and Mathieson (2019) and Webster *et al.* (2021). The duration of the initial *oom* note was not examined statistically, as this note was delivered at low amplitudes and was not reliably measurable.

Box plots were produced for these parameters for both the ‘mystery call’ and Painted Button-quail call using the ggplot2 package (Hadley 2016) in R (R Core Team 2020). In addition, the structure of each call sequence and individual *oom* note of the ‘mystery call’ were qualitatively described. To further investigate any potential differences between the ‘mystery call’ and calls of other button-quail species, analyses of variance (ANOVA) and principal components analyses (PCA) were performed. A one-way ANOVA was conducted in R for each measured vocal parameter, with the aforementioned species of button-quail comprising the categorical variable. Data were log transformed to meet the requirements of ANOVA. A Tukey’s Honestly Significant Difference (HSD) test was performed on the outputs of each one-way ANOVA to test for any significant differences between the vocal parameters of the ‘mystery call’ and those of

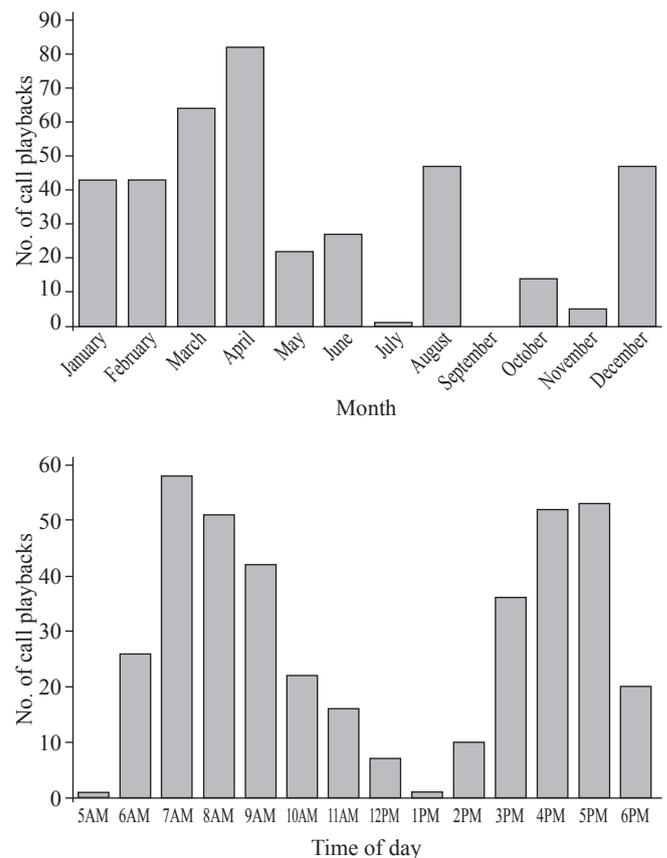


**Figure 2.** Map of north Queensland showing Mt Mulligan where the mystery call was recorded by Smith and Mathieson (2019). Call playback attempts with the ‘mystery call’ are shown as empty circles where no button-quail were detected or as closed circles where Painted Button-quail (PBQ) responded to the ‘mystery call’.

the Painted Button-quail; this *post-hoc* test was only performed on these two calls as they were the only ones visually and audibly indistinguishable from each other. A PCA was performed using the vocal parameters of each aforementioned species of button-quail to examine similarities between the ‘mystery call’ and other button-quail vocalisations. Spectrograms of representative recordings were produced in R using the package warbleR (Araya-Salas and Smith-Vidaurre 2017, R Core Team 2020).

#### Comparison with first-hand accounts of Buff-breasted Button-quail vocalisations

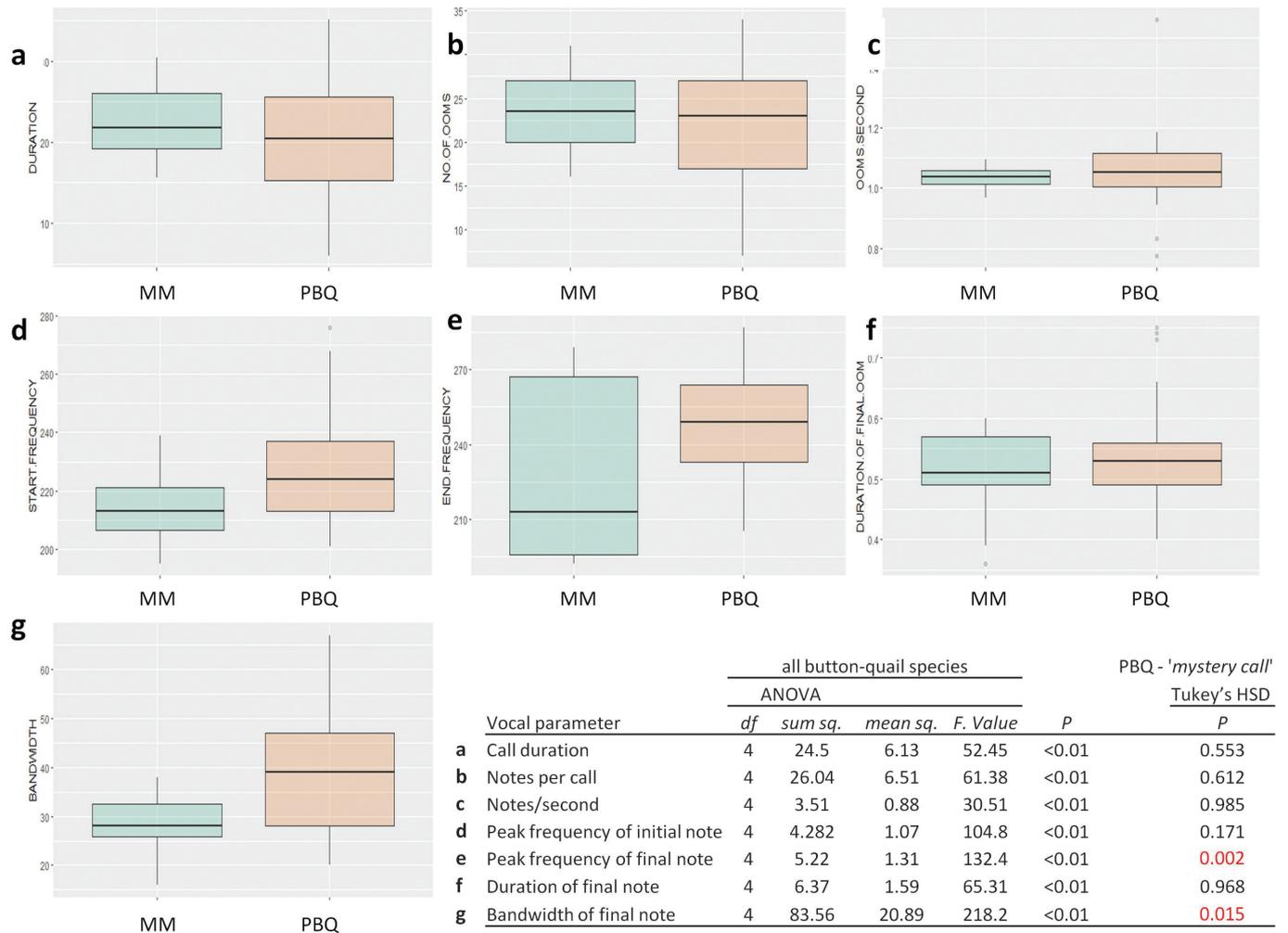
Smith and Mathieson (2019) reported strong similarities between the ‘mystery call’ and the only first-hand description of the vocalisation of the Buff-breasted Button-quail made by William Rae McLennan during a collecting trip to Coen on Cape York Peninsula (McLennan 1922). We sourced the diaries of McLennan’s 1921–1922 trip from the Queensland Museum. This material included the original hand-written diaries and the 1923 transcribed form (McLennan 1922). We sourced additional detail from White’s (1922 a, b) account of McLennan’s encounters with Buff-breasted Button-quail. The diaries and accompanying documents were studied for descriptions of the vocalisations of the Buff-breasted Button-quail.



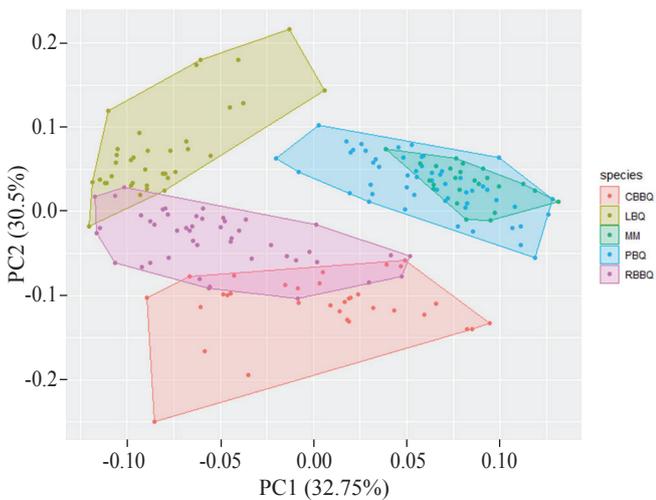
**Figure 3.** Timing of ‘mystery call’ playback surveys. Number of call playback surveys for each month during the study period grouped by month (top). Distribution of call playback surveys within a 24 hr period, grouped into one hour periods (bottom).

#### Call playback surveys

One high quality example of the ‘mystery call’ was provided in Smith and Mathieson (2019) and used by us for call playback between 2018 and 2021 in areas deemed to be suitable habitat for Buff-breasted Button-quail (Mathieson and Smith 2009) throughout the Wet Tropics, Einasleigh Uplands and Cape York Peninsula bioregions (Fig. 2). Call playback surveys were performed in every month of the year over the study period, except September (Fig. 3). Most call playback surveys were performed during the first and last three hours of daylight, although throughout the study some surveys were conducted across the entire daylight period. The minimum distance between call playback survey points was 300 m. To perform a playback survey, the call was played through a Bluetooth speaker (JBL GO2, Harman, Connecticut, USA) which was placed in an area of potentially suitable habitat, with the observer disguised under camouflaged netting or hidden in grass 10–20 m away. The recording lasted 35 seconds and was played repeatedly on a loop (with 15 seconds breaks between repeats) for 15 minutes or until a button-quail was detected. Any button-quail responding to the playback by approaching the speaker or calling was identified and recorded.



**Figure 4.** Box plots of vocal parameters (a-g) of 'Mt Mulligan 'mystery call' (MM) and Painted Button-quail (PBQ) call. Bottom right: corresponding one-way ANOVAs of vocal parameters with all button-quail species and Tukey's HSD tests for difference between Painted Button-quail call and 'mystery call'. Vocal parameters correspond to those presented in Figure 1.



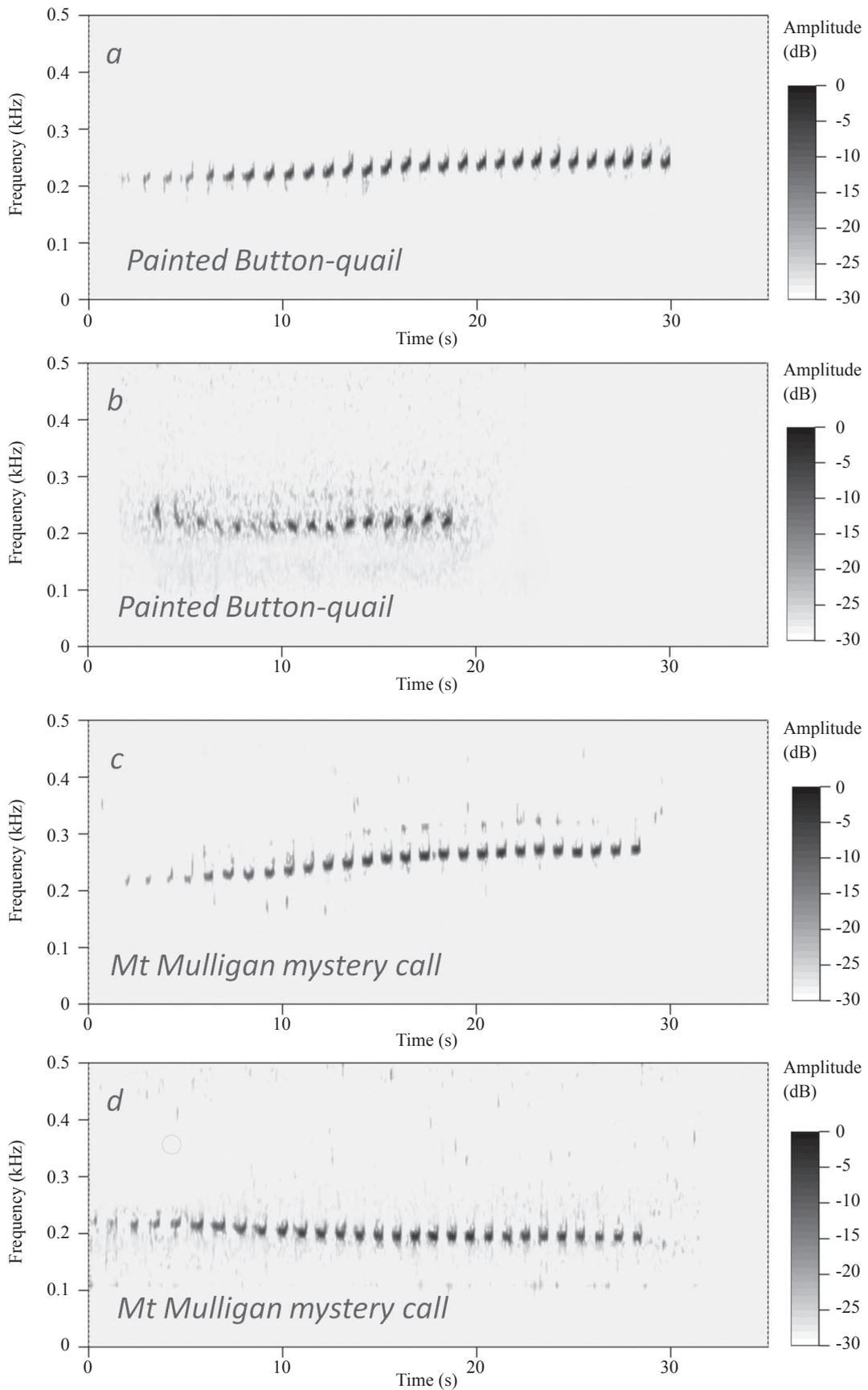
**Figure 5.** Principle Component Analysis (PCA) of vocalisations of button-quail using vocal parameters as variables. Species: Chestnut-backed Button-quail (CBBQ), Little Button-quail (LBQ), Mt Mulligan 'mystery call' (MM), Painted Button-quail (PBQ) and Red-backed Button-quail (RBBQ).

## RESULTS

### Statistical comparison of Mt Mulligan 'mystery call' with confirmed Painted Button-quail call

Visually, box plots suggested that there was considerable overlap in the vocal parameters of the 'mystery call' and those of the Painted Button-quail call, except for the peak frequency of the final note (Fig. 4). This impression was confirmed by the ANOVAs and Tukey's HSD tests. Of the seven analysed vocal parameters, only peak frequency and bandwidth of the final note displayed a significant difference between the 'mystery call' and the Painted Button-quail call ( $P = 0.002$  and  $0.015$ , respectively).

The PCA demonstrated clear clustering of the 'mystery call' within the Painted Button-quail cluster, whilst this cluster was separate from those of all the other species analysed (Fig. 5). A degree of overlap was present between the Chestnut-backed Button-quail and Red-backed Button-quail call distributions in the PCA, but despite this the vocalisations of these two species could be distinguished on the number of elements per oom note, a variable not incorporated in the statistical analysis. Chestnut-



**Figure 6.** Spectrograms of Painted Button-quail call (upper a, b) and ‘mystery call’ (lower c, d) showing the two different types of oom vocalisations. Rising type (a, c) -vocalisation starts at a low frequency and rises throughout the duration of the vocalization, Non-rising type (b, d) -vocalisation starts at a low frequency and may stay low or decrease in frequency throughout the duration of the vocalisation.

Table 1

Summary of vocalisation parameters of Painted Button-quail (Webster *et al.* 2023) and ‘mystery call’ (Smith and Mathieson 2019). Values displayed as mean  $\pm$  standard deviation and range (in parentheses): n = number of vocalisations analysed.

	Call Duration	No. notes/call	Notes/sec	Duration (sec.)		Peak frequency (Hz)		Bandwidth (Hz)
				Initial oom	Final oom	Initial oom	Final oom	Final oom
Painted Button-quail	20.7 $\pm$ 7.21 (5.97 – 35.13) n = 55	21.67 $\pm$ 6.87 (7 - 34) n = 55	1.06 $\pm$ 0.11 (0.77 – 1.56) n = 55	0.52 $\pm$ 0.10 (0.31 – 0.75) n = 47	0.53 $\pm$ 0.08 (0.4 – 0.75) n = 55	226.49 $\pm$ 17.69 (201 – 276) n = 53	247.75 $\pm$ 20.20 (205 – 287) n = 55	38 $\pm$ 11.28 (20 – 67) n = 55
‘Mystery call’	22.73 $\pm$ 4.83 (15.59 – 34.74) n = 24	23.42 $\pm$ 4.39 (16 - 33) n = 24	1.09 $\pm$ 0.04 (0.95 – 1.03) n = 24	0.52 $\pm$ 0.09 (0.34 – 0.66) n = 21	0.51 $\pm$ 0.05 (0.4 – 0.6) n = 24	214.04 $\pm$ 10.93 (195 – 239) n = 24	227.75 $\pm$ 36.05 (192 – 279) n = 24	28.96 $\pm$ 5.46 (20 – 38) n = 24

backed Button-quail had more than one element per *oom* note (giving each note a tremulous quality; Webster *et al.* 2021), whilst Red-backed Button-quail had only one element per *oom* note (P. Webster pers. obs.). Similarly, the calls of Little Button-quail and Red-backed Button-quail showed a degree of overlap, although the species’ vocalisations could be distinguished on bandwidth of the final note; Little Button-quail produced a final *oom* note that spanned a greater frequency (205  $\pm$  46 Hz) than that of the Red-backed Button-quail (56  $\pm$  21 Hz), (P. Webster unpubl. data).

The two different call types identified by Smith and Mathieson (2019) were apparent in both ‘mystery call’ and Painted Button-quail vocalisations (Fig. 6). The first call type (rising) starts at a low frequency of 200–230 Hz and rises to approximately 270 Hz (Fig. 6 a, c). The second call type (non-rising) also starts at a low frequency, but remains at a low frequency for the duration of the call or may even drop to a frequency lower than the starting frequency (Fig. 6 b, d). The non-rising call type of the ‘mystery call’ started and ended at a slightly lower frequency than that of the Painted Button-quail. The lowest peak frequencies of the initial and final *oom* note of the ‘mystery call’ were 195 Hz and 192 Hz, respectively, and for the Painted Button-quail they were 201 Hz and 205 Hz, respectively.

Three *oom* note structures were observed for Painted Button-quail; an upward slurred *oom*, a downward slurred *oom* and an *oom* that decreases and then increases in frequency, producing the shape of a ‘U’ spectrographically. The ‘U’-structured *oom* was most dominant in the ‘mystery call’ recordings; however, some notes of the ‘mystery call’ did display up-slurred or down-slurred characteristics, which was not reported by Smith and Mathieson (2019).

#### McLennan’s description of Buff-breasted Button-quail calls compared with the ‘mystery call’

McLennan’s (1923) descriptions of the Buff-breasted Button-quail’s vocalisations are the only first-hand descriptions available. On 21 November 1921 McLennan heard the *oom* vocalisation of the species and later imitated the call to bring the bird closer for collecting (shooting). The specimen from which the vocalisation was heard and described is now held at Museums Victoria (MV- HLW5045) (Webster *et al.* 2022). In his hand-written diaries, McLennan describes the call of the species thus: “a deep booming call Oomm-oomm-oomm- repeated

rapidly for about 20 seconds, it begins very low and gradually got louder and of a higher tone. Last note about 5 tones higher than first”. In a 1923 typewritten transcription, he adds that “the first few notes were very low and appeared to come from a great distance away, the succeeding notes gradually getting higher in tone, louder and shorter and more rapidly uttered.....Imitate the call, a rather difficult job, the bird answers a couple of times. In a few minutes I see it coming along through the short grass about 25 yds. away; get in a shot and secure it, a female by the size of it”. In White’s (1922a) account of McLennan’s trip additional detail of the call is added: “oomm, oomm, oomm repeated rapidly for twenty rounds.....The call took about 30 seconds of time.” Throughout his time at Coen encountering the Buff-breasted Button-quail, McLennan made notes of other call types heard, but none of these descriptions appear to resemble the advertising *oom*.

Twelve of the ‘mystery call’ recordings fit the first two components of McLennan’s description with respect to rising tone (frequency) and increasing loudness (rising amplitude) (Fig. 6 c); the remaining 12 recordings of the ‘mystery call’ increase only in amplitude, not frequency (Fig. 6 d). Further, the latter two aspects of McLennan’s description regarding notes that get shorter and are more rapidly uttered do not conform to the ‘mystery call’, nor does McLennan’s description of “rapidly” repeated notes. McLennan suggests that the individual *oom* notes of the Buff-breasted Button-quail call decline in duration as the call progresses. The ‘mystery call’ call does not conform with this aspect of McLennan’s description, as the initial and final notes of the ‘mystery call’ are of nearly identical duration (Table 1). The final component of McLennan’s description suggests that each individual *oom* note becomes “more rapidly uttered” as the call progresses and the notes throughout the sequence are repeated rapidly. In contrast, the ‘mystery call’ is a series of slow to moderately spaced notes, which is difficult to interpret as “repeated rapidly”, although interpretation of this is speculative.

#### Call playback of ‘mystery call’

Call playback surveys (n= 396) were performed across north Queensland. Only Painted Button-quail responded to the ‘mystery call’, by walking to the source of the playback (n = 105) or calling (n = 23). These button-quail were visually identified to ensure correct species identification. No response was detected from Red-backed, Red-chested or Little Button-quail despite them being present at the sites when playback was performed

(Webster pers. obs.). There were no responses to call playback that were not identified. Additional playback of the ‘mystery call’ was performed at sites in the Northern Territory where Chestnut-backed Button-quail were definitely known to be present, but no response was recorded. Playback of the ‘mystery call’ was also successful in attracting both male and female Painted Button-quail in SE Queensland and the isolated subspecies, the Abrolhos Painted Button-quail *T. varius scintillans*, on the Houtman Abrolhos islands, 80 km off the coast from Geraldton in Western Australia (N. Jackett pers. comm.).

## DISCUSSION

Smith and Mathieson (2019, p. 29) argue that their ‘mystery calls’ “appear to differ sufficiently” from reference calls of co-occurring button-quail species, including those of the Painted Button-quail, such that it can be assumed that the call is not given by any of these species. They present three arguments to support the identification of the ‘mystery call’ as being that of the Buff-breasted Button-quail. We addressed these arguments to determine the degree to which Smith and Mathieson’s (2019) conclusions are supported.

### *Statistical comparison of Mt Mulligan ‘Mystery Call’ with confirmed calls of Painted Button-quail*

Smith and Mathieson (2019) suggest that the ‘mystery call’ was different to that of the Painted Button-quail with respect to several sound parameters, as well as call type and note structure. Our analysis showed that in five of the seven vocal parameters analysed there was no difference between the ‘mystery call’ and the call of the Painted Button-quail; only peak frequency and bandwidth of the final *oom* note were significantly different. The difference in bandwidth is likely to be due to the small sample size for the ‘mystery call,’ as the range for this parameter (20–38 Hz) is within that of the Painted Button-quail (20–67 Hz). The difference in peak frequency of the final *oom* note is 13 Hz, which is a difference of 6.3% between the Painted Button-quail and the ‘mystery call’. The PCA shows that the ‘mystery call’ falls almost completely within the Painted Button-quail cluster, and clusters for other species in this comparison are quite distinct. Qualitative analysis of the spectrograms of the ‘mystery call’ and Painted Button-quail vocalisations also show strong similarities between the two calls. However, the significant differences in the peak frequency and bandwidth of the final *oom* between the ‘mystery call’ and Painted Button-quail call cannot be entirely ignored, despite their small magnitude. Nonetheless, given the overwhelming similarities between the ‘mystery call’ and Painted Button-quail call in every other regard, we argue that there is no strong evidence to suggest that the ‘mystery call’ is sufficiently different to our library of Painted Button-quail vocalisations to suggest that it belongs to any other species of button-quail.

The two call types described by Smith and Mathieson (2019) for the ‘mystery call’ were also observable in spectrograms of the Painted Button-quail call. The ‘U’ or “upward horseshoe” *oom* note structure which Smith and Mathieson (2019) described as unique to the ‘mystery call’ and hence not observed in Painted Button-quail vocalisations was frequently observed in our library of Painted Button-quail vocalisations (Webster *et al.* 2023). Thus the apparent differences noted by Smith and Mathieson (2019) between the ‘mystery call’ and Painted

Button-quail calls are likely to be due to the limited and non-representative sample of Painted Button-quail vocalisations used for their comparison. Their reference collection of Painted Button-quail calls comprised seven vocalisations, six of which were recorded in New South Wales and one being of unknown provenance, compared to 55 locally sourced Painted Button-quail vocalisations used in our analysis. Whether regional differences in vocalisations exist in the Painted Button-quail is unknown; despite this, the small sample size used by Smith and Mathieson (2019), which evidently did not demonstrate the breadth of the species’ vocalisations, may have led to the perceived differences between the ‘mystery call’ and that of the Painted Button-quail.

### *Comparison with McLennan’s verbal descriptions of Buff-breasted Button-quail vocalisations*

Smith and Mathieson (2019) argued that their recording of the ‘mystery call’ “fits the description given by McLennan (p. 29)” of a Buff-breasted Button-quail vocalisation. Whilst this is partly true, we suggest that they have overlooked critical aspects of McLennan’s commentary which actually contradict their conclusion. Smith and Mathieson’s (2019) interpretation drew only on McLennan’s description of call duration, rising amplitude and rising frequency. With respect to these characteristics, McLennan’s description would certainly match the calls of Red-backed Button-quail, Painted Button-quail and Chestnut-backed Button-quail. McLennan describes the notes of the Buff-breasted Button-quail call as “succeeding notes gradually getting higher in tone, louder shorter and more rapidly uttered”. The ‘mystery call’ recordings exhibit notes that increase in amplitude (loudness) in accordance with McLennan’s description, and half of the recordings conform to the existence a rising frequency (pitch) as the vocalisation progresses. However, the latter aspects of McLennan’s description of succeeding notes decreasing in duration and becoming more rapidly uttered are not apparent in the ‘mystery call’. McLennan’s description of succeeding notes being “more rapidly uttered” may suggest that the notes are delivered at a faster pace or that the shortening of the duration between them and the increase in pitch of each note may give the impression of a more forced and hence “more rapidly uttered” note. An alternative interpretation of “more rapidly uttered” could be that each *oom* note is composed of repeated elements, such as those observed in the Chestnut-backed Button-quail (Webster *et al.* 2021). In this interpretation, McLennan’s description of “oomm’, oomm, oomm” may be referring to a *single* tremulous *oom* note, where “oomm, oomm, oomm” is delivered rapidly in succession and repeated for “20 rounds”. In any interpretation of “more rapidly uttered” and “repeated rapidly,” neither structure conforms to that of the ‘mystery call’.

A final piece of information given by McLennan that may not match the description of the ‘mystery call’ is that imitating the Buff-breasted Button-quail’s call is “a rather difficult job”. The ‘mystery call’ is easily imitated, as it is a simple series of single, deep notes. Given that McLennan was a field naturalist with decades of experience (Mason and Pfitzner 2020), it seems unlikely that he would describe the simple series of notes as described by Smith and Mathieson (2019) as difficult to imitate. Furthermore, throughout his diaries he made no mention of the call of the Buff-breasted Button-quail being in any manner similar to that of the Painted Button-quail. McLennan’s

description of a Buff-breasted Button-quail vocalisation could be a better fit for a tremulous type *oom*, as seen in the Chestnut-backed Button-quail. This is not unexpected, given that Chestnut-backed and Buff-breasted Button-quail are thought to be closely related (Macdonald 1971), and were for a period believed to be the same species (Peters 1934; Rogers 1995). The call of the Chestnut-backed Button-quail, like most button-quail vocalisations, starts at a low amplitude and frequency and rises throughout the duration of the sequence. The *oom* notes of the Chestnut-backed Button-quail decline in duration throughout the call sequence, so that the final note is noticeably shorter than the initial one (Webster 2021). McLennan's estimation of the duration of the Buff-breasted Button-quail call is 20–30 seconds; he later adds that the call consists of “20 rounds” interpreted as *oom* notes, with a call lasting “30 seconds of time”. This is consistent with the *oom* vocalisation of the Chestnut-backed Button-quail, which has on average 20.9 notes per call and lasts 28.2 seconds (Webster *et al.* 2021). Taken together, these elements of McLennan's descriptions of the Buff-breasted Button-quail call suggest that it may actually be quite similar to the call of the Chestnut-backed Button-quail.

#### Call Playback

The third line of evidence used by Smith and Mathieson (2019) was that on 25 February 2016 a Buff-breasted Button-quail was drawn in to view using call playback of the ‘mystery call’. They state that a pair of Buff-breasted Button-quail walked in to “approximately 8 m from the speaker” before being “spooked” and walking off. Following this, the birds were pursued and flushed, enabling “good identifying views”. No further justifying evidence supporting the observation of Buff-breasted Button-quail was presented (Mathieson and Smith 2017; Smith and Mathieson 2019). It is now well established that button-quail are responsive to playback of their species' advertising *oom*; this includes the Buff-breasted Button-quail, which McLennan (1922) would draw into range for collection (shooting) by imitating the species' vocalisation. It is therefore logical that Buff-breasted Button-quail could be drawn in to call playback, providing that the call used for playback was legitimately that of a conspecific and Buff-breasted Button-quail were present in the area. Despite the reported success of call playback by Smith and Mathieson (2019), in the 396 call playback surveys conducted as part of our research no Buff-breasted Button-quail were detected responding to the ‘mystery call’, although 128 Painted Button-quail responded. Further, Painted Button-quail in other parts of Australia also responded strongly to the ‘mystery call’, including members of other sub-species (Jackett pers. comm.). This lack of response by Buff-breasted Button-quail to playback of ‘the mystery call’ occurred at sites across the Wet Tropics and Einasleigh Uplands bioregion where Buff-breasted Button-quail have previously been reported (Mathieson and Smith 2009), including the site where the ‘mystery call’ was recorded at Mt Mulligan.

Between 2018 and 2021, monitoring of the Mt Mulligan site where the Buff-breasted Button-quail sighting was reported and the ‘mystery call’ was recorded (Mathieson and Smith 2017; Smith and Mathieson 2019) produced no evidence of a population of Buff-breasted Button-quail (Webster unpubl. data). However, Painted Button-quail were routinely detected at the site in walking surveys and by ARUs, camera trapping and call playback (including using the ‘mystery call’). It has also

recently been demonstrated that the features commonly reported as being helpful for visually distinguishing Buff-breasted Button-quail from Painted Button-quail in field conditions are inaccurate (Webster 2022). Field observers have previously relied heavily on size and plumage as identification features (Nielsen 2015); however, these characters are not sufficient to enable a correct identification (Webster 2022). At the time that Mathieson and Smith (2017) reported Buff-breasted Button-quail from Mt Mulligan and recorded the ‘mystery call’, these incorrect identification features were commonly used to distinguish the two species. It is possible that the button-quail seen by Smith and Mathieson was a Painted Button-quail, and was misidentified as a Buff-breasted Button-quail; no notes or other details were provided with the observation that confirm the species identification. This would explain the subsequent detection of what we have demonstrated were most likely numerous Painted Button-quail vocalisations from the site.

## CONCLUSIONS

Our findings document very strong similarities between the ‘mystery call’ and the call of the Painted Button-quail. We explored the evidential arguments of Smith and Mathieson (2019) using a larger and locally-sourced reference collection of Painted Button-quail vocalisations (Webster *et al.* 2023). The ‘mystery call’ did not appear to differ greatly from Painted Button-quail vocalisations (*contra* Smith and Mathieson 2019). Further, a more thorough examination of McLennan's (1922) first-hand description of a Buff-breasted Button-quail vocalisation suggested dissimilarity between it and the ‘mystery call’. We demonstrated extensive evidence of Painted Button-quail responding to ‘mystery call’ call playback, with no response by Buff-breasted Button-quail being observed. Furthermore, in monitoring of the Mt Mulligan site we have been unable to detect the presence of a population of Buff-breasted Button-quail (Webster unpubl. data.). Given the overwhelming similarities between the ‘mystery call’ and Painted Button-quail calls and the strong response of Painted Button-quail to the ‘mystery call’, we believe that it is likely that the ‘mystery call’ is actually that of a Painted Button-quail. These findings raise questions about the veracity of the Buff-breasted Button-quail sightings from Mt Mulligan.

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