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Descriptions of the vocalisations of the Painted Button-quail *Turnix varius* in North Queensland

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Abstract. The Painted Button-quail *Turnix varius* is a widespread and frequently encountered ground-dwelling bird endemic to Australia. Despite being regularly recorded throughout its distribution, our understanding of this species' vocalisations is poor. Published accounts are limited to brief descriptions without quantitative analyses in a standardised format. This presents challenges in separating the vocalisations of this species from other similar species, particularly as vocalising button-quail are seldom observed. We recorded the vocalisations of Painted Button-quail from North Queensland. These vocalisations were identified as advertising *oom*s, *drumming* and contact calls. These vocalisation types appear analogous to those described for other button-quail species, though some key differences particularly in the advertising *oom* will likely prove diagnostic. Here we present descriptions and visual representations of each of these vocalisation types.

Introduction

The Painted Button-quail *Turnix varius* is one of the most frequently encountered button-quail in Australia (eBird 2022). Despite this, basic aspects of this species' natural history remain poorly documented. To date, our understanding of the Painted Button-quail has been based on observations by natural historians, birdwatchers, and anecdotal notes from captive populations (Marchant & Higgins 1993). Yet the recent advancement of relatively cheap Autonomous Recording Unit (ARU) technology is now offering an effective means of both detecting and identifying cryptic and elusive birds such as button-quail (Shonfield & Bayne 2017). However, the use of these technologies to effectively detect and identify button-quail has been limited because of the inadequate understanding of each species' vocalisations. The current descriptions are not sufficiently detailed to attempt identification of vocalisations of unknown button-quail in field recordings.

The importance of correctly identifying button-quail solely on vocalisations was highlighted recently by Smith & Mathieson (2019). These authors attempted to identify the species of button-quail responsible for a series of vocalisations recorded at Mt Mulligan in the Einasleigh Uplands of North Queensland, following a claimed sighting of Buff-breasted Button-quail *T. olivii*. Their work was based on a relatively small dataset, including seven vocalisations of the Painted Button-quail, and fewer for the two other species – Little Button-quail *T. velox* (n = 3) and Red-backed Button-quail *T. maculosus* (n = 2). Despite the difficulty encountered with proving which species was responsible for the vocalisation, these authors have provided a useful framework for visualising and analysing button-quail calls, which we adapt here.

It is widely accepted that button-quail produce three distinct vocalisation types, which appear to be analogous across the genus: an advertising *oom*, a *drum* and a diversity of distinct contact calls (Marchant & Higgins 1993; Debus 1996). The advertising *oom* of the Painted Button-quail has been described by many natural historians across this species' distribution: Clements Gap, South Australia (Pedler 1975); Melbourne, Victoria (Ross 1929); Sydney (Hindwood 1937) and Macleay River, New South Wales (De Warren & Neville 1928); and Murphy's Creek (Lord 1956), Atherton (Bravery 1970) and Davies Creek, Queensland (Squire 1990). In fundamentally the same terms, these authors described a deep booming call repeated many times over, similar to calls of the Tawny Frogmouth *Podargus strigoides* (De Warren & Neville 1928), Common Bronzewing *Phaps chalcoptera* (Ross 1929; Pedler 1975) or Brush Bronzewing *P. elegans* (Hindwood 1937). De Warren & Neville (1928) attributed this advertising *oom* call to the male, but it has now been established that this is a female-specific vocalisation (Debus 1996), as it is with other button-quail (Webster *et al.* 2021). Despite the many descriptions of this advertising *oom* from various locations and authors, little has been done to analyse or describe the parameters of this vocalisation.

The *drum* and contact calls of the Painted Button-quail appear far less frequently in the literature. The *drum* call given by the female has been described as a rapid *drumming*, delivered at a rate of four syllables per second (Marchant & Higgins 1993). It has been recorded in response to the advertising *oom* and during courting (Marchant & Higgins 1993). Other button-quail species have also been recorded making a *drum* call (Hughes & Hughes 1991; Marchant & Higgins 1993; Debus 1996; Webster *et al.* 2021); however, in the absence of any form of analysis, it is difficult to determine the differences between *drum* calls of different species.

Additionally, a variety of short contact calls has been noted for the Painted Button-quail, but with limited descriptions (Marchant & Higgins 1993). As with the other vocalisations, there have been no analyses of these vocalisation types; hence, interpreting previous descriptions is difficult. Descriptions of specific contact calls include: clucking, bubbling chatter, chirping, churring and crooning delivered by both male and female (Marchant & Higgins 1993).

Table 1. Summary of parameters measured from spectrograms of advertising *oom* calls of Painted Button-quail. Values are displayed as mean ± standard deviation and range (in parentheses); *n* = number of recordings analysed.

Call duration (sec.)	*Notes*		*Pause between notes (sec.)*	*Duration (sec.)*		*Peak frequency (Hz)*		*Bandwidth end note (Hz)*
	No./call	*No./sec.*		*Initial oom*	*Final oom*	*Initial oom*	*Final oom*	*Final oom*
20.7 ± 7.21	21.67 ± 6.87	1.06 ± 0.11	0.45 ± 0.07	0.52 ± 0.10	0.53 ± 0.08	226.49 ± 17.69	247.75 ± 20.20	38 ± 11
(5.97–35.13)	(7–34)	(0.77–1.56)	(0.33–0.62)	(0.31–0.75)	(0.4–0.75)	(201–276)	(205–287)	(20–67)
n = 55	*n* = 55	*n* = 55	*n* = 55	*n* = 47	*n* = 55	*n* = 53	*n* = 55	*n* = 55

Painted Button-quail chicks have been noted making faint peeping noises (Marchant & Higgins 1993).

Here we present descriptions of the three main types of vocalisation of the nominate subspecies of the Painted Button-quail, *T. v. varius,* in North Queensland. We also present visual representations and spectral parameters that will assist in identification of Painted Button-quail vocalisations and allow comparisons with other button-quail species.

Study area and methods

The vocalisations described in this paper were recorded between 2018 and 2022 in the Wet Tropics and Einasleigh Uplands bioregions of North Queensland, from six locations: Mareeba Wetlands (S16.93, E145.36), Mount Molloy (S16.71, 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). All recordings were made using either: a Sennheiser ME66 shotgun microphone (Sennheiser electronic GmbH & Co. KG, Wedemark, Germany) coupled with a Tascam DR-40 (TEAC Corporation, Montebello, United States of America) or Zoom H4N recorder (Zoom Corporation, Tokyo, Japan); or Song Meter 4 (ARU: Wildlife Acoustics, Massachusetts, USA). At all locations and for all recordings, the vocalising bird was positively identified to ensure the veracity of each recording. This was done visually when using the shotgun microphone, or by pairing the ARU with a camera trap (HF2X, Reconyx, Wisconsin, USA). Three sets of ARU and camera-trap combinations were used at Mareeba Wetlands. They were set low on a tree in areas where Painted Button-quail had been detected previously. The ARU was set to record audio and the camera trap was set to trigger from sunrise to sunset for a 3-week period. On retrieval, the files from the camera trap were scanned for detections of Painted Button-quail, and the date and time of any detection noted. The corresponding date and time of the audio file from the ARU was then scanned for button-quail vocalisations.

Audio recordings were recorded as 'wav' files before being imported to Audacity (Audacity 2.2.2: Audacity Team 2018) for post-processing and analyses. Spectrograms of selected audio recordings were produced in *R* (R Core Team 2020) using the package *warbleR* (Araya-Salas & Smith-Vidaurre 2017). Measurements and analyses of vocalisations were taken from the spectrograms produced in Audacity, using the same methods presented by Smith & Mathieson (2019) and Webster *et al.* (2021). Throughout this paper, all descriptive statistics are given as mean ± standard deviation (and range minimum–maximum); *n* = number of records.

Results

Recordings were made of 122 Painted Button-quail vocalisations representing three broad call types: advertising *oom*s, *drumming* and contact calls. Contact calls were separated into two broad categories: territoriality and passive contact calls, representing 16 distinct calls. Of these, 74 were recorded with the shotgun microphone and handheld recorder and 48 were recorded using the ARU and camera trap. It is important to note that some of these recordings contained a combination of call types. Qualitatively each vocalisation type was consistent and showed no obvious variability.

Advertising oom

The advertising *oom* was a series of distinct deep booming notes (*oom*s), each note being comprised of a single element. The initial *oom* notes were low and soft, then rose in frequency and amplitude throughout the call, with a distinct pause [0.45 ± 0.07 seconds (*n* = 55): Table 1] between individual notes (measured as a single pause from 55 vocalisations). Less common was an advertising *oom* with notes that started low in pitch but stayed low or dropped below the starting frequency (*n* = 7). A single call comprised 22 ± 6.87 individual *oom* notes (*n* = 55), delivered at a mean rate of 1.06 ± 0.11 notes per second (*n* = 55). The peak frequency of the initial and final *oom* notes was 226.49 ± 17.69 Hz (*n* = 53) and 247.75 ± 20.20 Hz (*n* = 55), respectively. For clear recordings, those where the subject was close to the recording microphone, an overtone ~50 Hz higher than the fundamental frequency of each individual note was detected. Three distinct types or shapes of individual *oom* notes were detected (Figure 1): the *oom* element may start at a higher frequency and drop to a lower frequency (Figure 1a); it may start at a high frequency, drop in pitch, then return to the start frequency, giving a 'U' shape (Figure 1b); or, it may start at a lower frequency and rise in pitch and end at a higher frequency (Figure 1c). Some variability was noted in these parameters for this call type (Table 1) but no discernible difference was noted between localities.

Only females were recorded giving the advertising *oom*. In the study area, this call type was heard most frequently

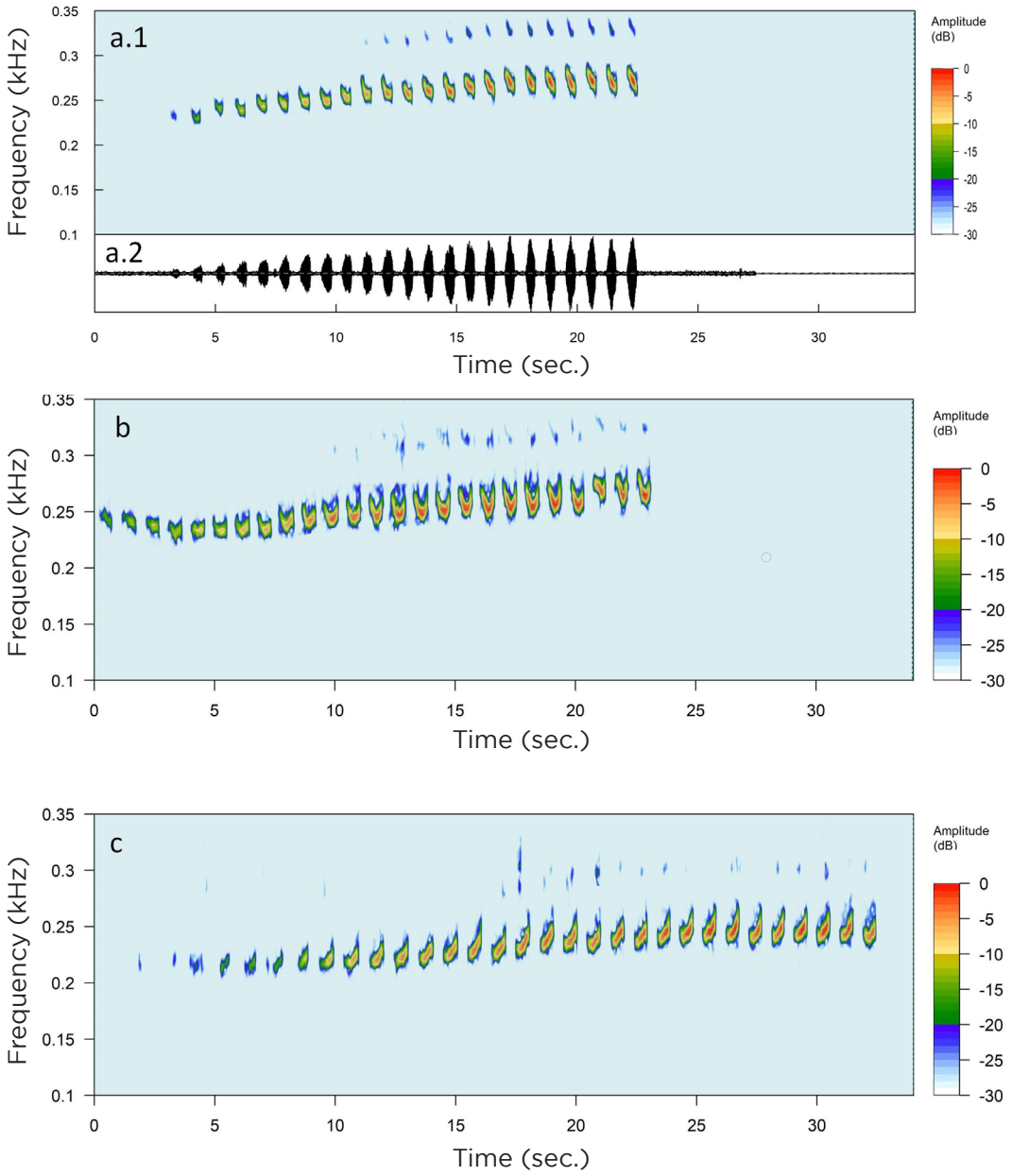

Figure 1. Spectrograms of typical advertising *oom* calls of female Painted Button-quail, showing variability of note structure. (a) Spectrogram (a.1) and waveform (a.2) of call recorded at Mount Molloy, Queensland, January 2019. Each *oom* note drops in pitch, giving each note a down-sloped appearance. The call starts soft and amplitude increases throughout. (b) Call recorded at Mount Molloy, March 2020. Each *oom* note drops in pitch before rising again, giving each note a 'U' appearance. (c) Call recorded at Wondecla, Queensland, January 2021. Each *oom* note rises in pitch, giving each note an up-sloped appearance.

throughout the wet season (December–April), particularly in the cooler periods of the morning and afternoon. When performing this vocalisation, the female adopted a particular posture (Figure 2), similar to that described for the Chestnut-backed Button-quail (Webster *et al.* 2021).

Drum

The *drum* call was a short, deep rattle composed of rapidly repeated elements delivered at a rate of 15.49 ± 2.17 elements per second (n = 25). The initial elements were typically delivered at a lower frequency and amplitude and slowly rose in both frequency and amplitude throughout the duration of the call (Figure 3). The rise in amplitude and frequency were only subtle and difficult to discern in field conditions. The *drum* had a duration of 2.85 ± 1.34 seconds (n = 26) and a peak frequency of 293.04 ± 23.27 Hz (n = 25). Some variations in the parameters of this call type were noted (Table 2) but the structure was largely consistent across recordings.

The *drum* call was much softer than the advertising *oom* and was only audible at a short distance of ~10 m. It was recorded in response to both the advertising *oom* and the *drum* call. To perform this vocalisation, the bird adopted a similar stance to that when performing the advertising *oom* (Figure 3). The delivery appeared identical to that of the Chestnut-backed Button-quail, as described by Webster *et al.* (2021).

Figure 2. The body position adopted by a female Painted Button-quail during an advertising *oom* or *drum* call. Note the heavily inflated dorsal area of the bird's neck. Photo: Patrick T.D. Webster

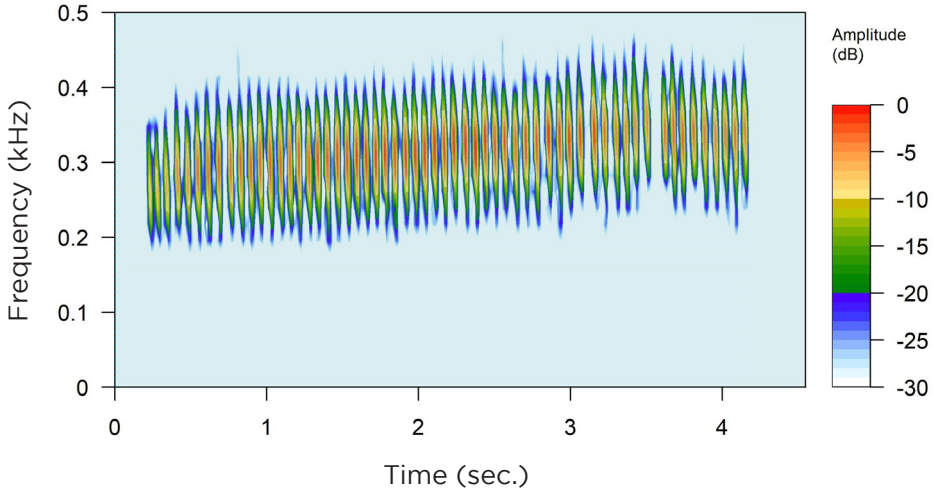

Figure 3. Spectrogram of typical *drum* call of a female Painted Button-quail, recorded at Emerald Creek, North Queensland, 9 April 2020. Note the slight rise in pitch and amplitude as the call progresses, and the distinct elements that constitute this call.

Contact calls

Two distinct groups of contact calls were recorded in this study. Firstly, calls associated with response to call-playback (and presumably representing territorial behaviour) and, secondly, passive calls associated with foraging behaviour. Seven different call types associated with territorial behaviour were recorded; they were given in a series interspersed with the *drum* call (Figure 4,Table 3). These vocalisations were of a lower amplitude but higher frequency than either the advertising *oom* or *drum* call. Female Painted Button-quail were recorded giving these contact calls in response to call-playback but it is unknown whether the male also produces these calls. Both male and female were recorded giving the passive contact calls.

Passive contact calls associated with foraging behaviour were recorded from the camera trap and ARU deployment. One camera trap indicated that three Painted Button-quail, one female and two males, were foraging within ~2 m of the ARU for periods in excess of 10 minutes. During the periods that the birds were near the recorder they gave contact calls continuously. Nine different clucks and whistles categorised as passive contact calls were recorded (Figure 5, Table 4).

Discussion

The recordings obtained during this study suggest that the Painted Button-quail has three distinct vocalisations, consistent with other members of the genus. The same three vocalisation types have been identified for the Chestnut-backed Button-quail (Webster *et al.* 2021) and Black-breasted Button-quail *Turnix melanogaster* (Hughes & Hughes 1991) and are likely produced by each member of the genus (Debus 1996). Although the vocalisations presented here are from a small portion of the Painted Button-quail's wide geographic range, we did not discern obvious variation in call types across the three vocalisations. Whether any variation is present across the species' distribution remains unknown, as does any variation between subspecies *T. v. varius* and *T. v. scintillans*.

Table 2. Summary of parameters measured from spectrograms of drum calls of Painted Button-quail. Values are displayed as mean ± standard deviation and range (in parentheses); *n* = number of recordings analysed.

Call duration (sec.)	*Duration of element (sec.)*	*Elements*		*Peak frequency (Hz)*		
		No./call	*No./sec.*	*Entire call*	*Initial element*	*Final element*
2.85 ± 1.34	0.05 ± 0.01	45.15 ± 22.30	15.49 ± 2.17	293.04 ± 23.27	267.5 ± 26.69	305.08 ± 31.66
(0.72–5.52)	(0.04–0.06)	(11–94)	(11.22–18.93)	(258–328)	(208–317)	(224–354)
n = 26	*n* = 25	*n* = 26	*n* = 26	*n* = 25	*n* = 26	*n* = 26

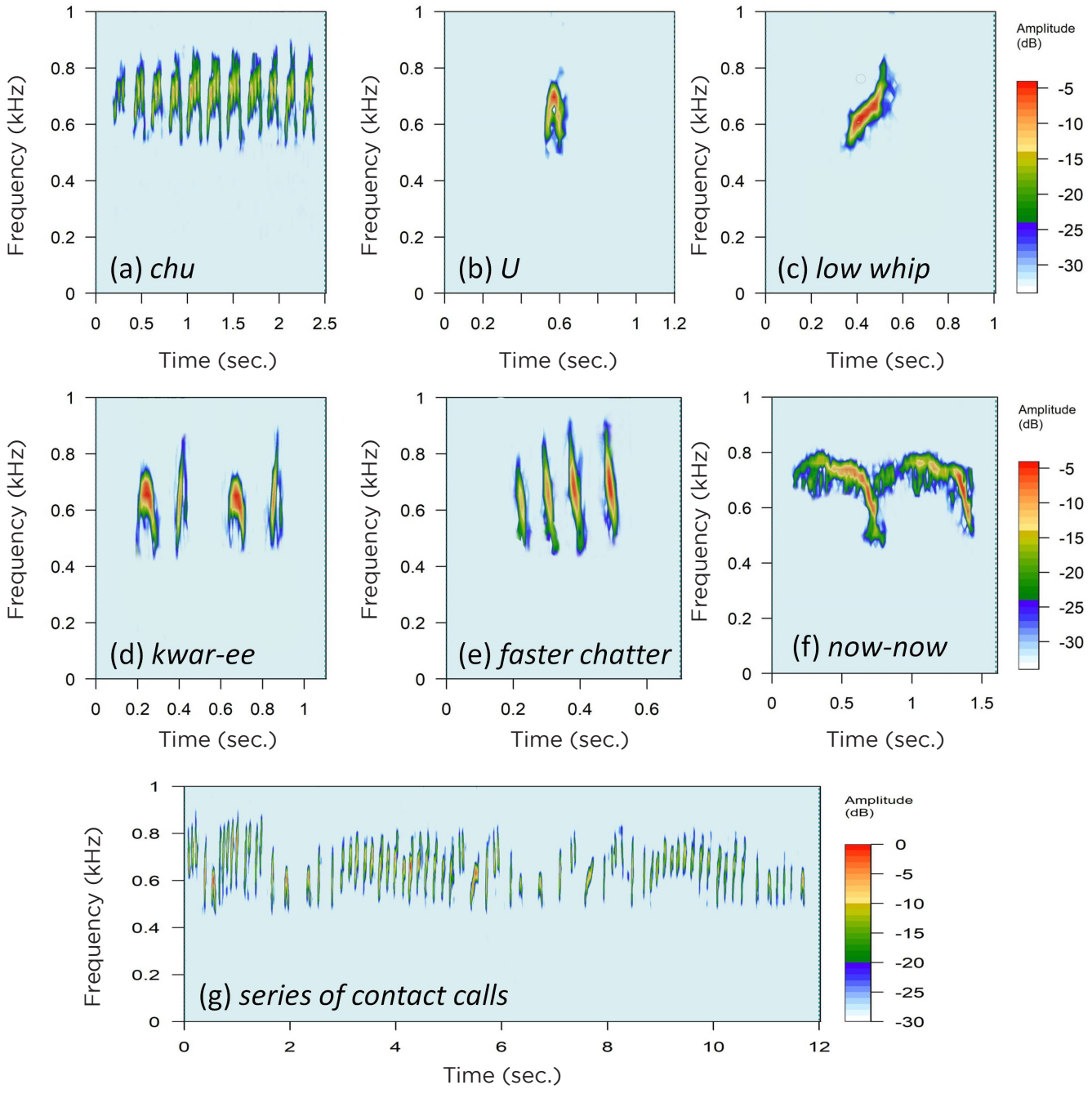

Figure 4. Spectrograms of vocalisations of Painted Button-quail identified as contact calls. (a–f) Contact calls associated with response to advertising ooms, as described in Table 3. (g) Example series of contact calls. Note that the scale is consistent on the *y* axis (kHz) but varies on the *x* axis (seconds).

Table 3. Descriptions and parameters of vocalisations of Painted Button-quail identified as contact calls given in response to an advertising *oom*. Values are displayed as mean ± standard deviation and range (in parentheses); *n* = number of recordings analysed.

Vocalisation	*Description*	*Duration (sec.)*	*Peak frequency (Hz)*	*No. elements*	*Comments*
Chu (Figure 4a)	Series of chattering phrases repeated at rate of 5 phrases/sec. Individual phrases are composed of ~5 elements delivered at rate of ~30 elements/sec. Initial and final elements of a single phrase are delivered at a lower frequency than middle three.	2.86 ± 1.84 (1.06–8.78) *n* = 16	680 ± 30.99 (604–711) *n* = 16	14 ± 8.14 (4–40) *n* = 16	Interpreted as *chu-chu-chu-chu.*
U (Figure 4b)	Short whistle that rises rapidly in pitch to an apex and typically drops to its starting frequency.	0.12 ± 0.00 (0.12–0.13) *n* = 7	646 ± 52.37 (582–704) *n* = 7	1, occasionally paired	Appears in a spectrogram like an inverted U.
Low whip (Figure 4c)	Single element that rises rapidly in pitch, starting at ~400 Hz and rising to ~750 Hz.	0.18 ± 0.02 (0.13–0.22) *n* = 51	611 ± 27 (522–659) *n* = 51	1	Typically given singly. Often precedes a *now-now* and *drum* vocalisation. Also precedes *drum*.
Kwar-ee (Figure 4d)	Typically, paired elements comprising a descending element followed by a *cluck.* Initial descending element is of slightly higher amplitude.	0.33 ± 0.23 (0.23–1.24) *n* = 18	629 ± 20.39 (588–651) *n* = 18	1, occasionally 2 or 3	Occasionally reversed, i.e. *cluck* first.
Fast chatter (Figure 4e)	Series of repeated *cluck* vocalisations given in quick succession. Typically, 3–4 elements in a series.	0.29 ± 0.19 (0.13–0.84) *n* = 17	670 ± 52 (559–7567) *n* = 17	3 ± 1.75 (2–9) *n* = 17	Sounds like a chuckling laughter.
Now-now (Figure 4f)	Nearly identical paired down-slurred *clucks*. Both elements start at ~800 Hz and drop to ~500 Hz.	1.23 ± 0.16 (1.07–1.45) *n* = 8	708 ± 36.95 (646–755) *n* = 8	2	Always given as a pair and often preceded by a *low whip* vocalisation. Interpreted as a nasal *now-now*.
Cluck	Simple *cluck* given as a single or repeated element. Given at a variable rate. Can be grouped into low- (400–800 Hz) and high-frequency (700–1000 Hz) *clucks*.	0.62 ± 0.85 (0.07–2.67) *n* = 16	625 ± 61.89 (533–829) *n* = 16	0.3 ± 3.15 (1–11) *n* = 16	*Clucks* appear to make up fast *chatter* vocalisation and latter part of *kwar-ee* vocalisation.

The advertising *oom* of the Painted Button-quail appears similar to that of other button-quail species, being a series of resonant, deep *oom* notes. Where the Painted Button-quail appears to differ from some other species of Australian button-quail is in the structure of the individual *oom* note. Each note of the Painted Button-quail advertising *oom* is comprised of a single steady element, whereas in the Chestnut-backed Button-quail (Webster *et al.* 2021) and Black-breasted Button-quail (Hughes & Hughes 1991) each *oom* note is comprised of a series of rapidly repeated elements, giving each note a tremulous quality. This may also be true for the Buff-breasted Button-quail, whose call was described by McLennan (1922, p. 72) as "oomm, oomm, oomm repeatedly rapidly", perhaps representing a tremulous *oom* call.

The individual notes of the *oom* call of the Red-backed and Little Button-quail, like the Painted Button-quail, are a single *oom* element (Marchant & Higgins 1993; PTDW pers. obs.). The *oom* call of the Red-chested Button-quail remains poorly known (Marchant & Higgins 1993). The advertising *oom* of button-quail is regarded as being made only by the female. Our findings support this, with no evidence that male button-quail make an advertising *oom* (*contra* De Warren & Neville 1928). The advertising *oom* has been associated with breeding and territoriality in other button-quail species (McLennan 1922: Hughes & Hughes 1991; Webster *et al.* 2021). Similarly, our observations suggest that the female Painted Button-quail greatly increases the regularity of the advertising *oom* during the wet season of northern Australia (December–April), when breeding has been observed (PTDW unpubl. obs.). During this period, the advertising *oom* was heard most frequently during the early morning and late afternoon, but throughout the day if conditions were overcast, and occasionally during the evening. Females of this species readily responded to the *oom* call (via call-playback), either by walking to the source of the call or by vocalising from their standing location. Sometimes, playback of this call also elicited a response by males, but they responded only vocally, with short soft contact *clucks*.

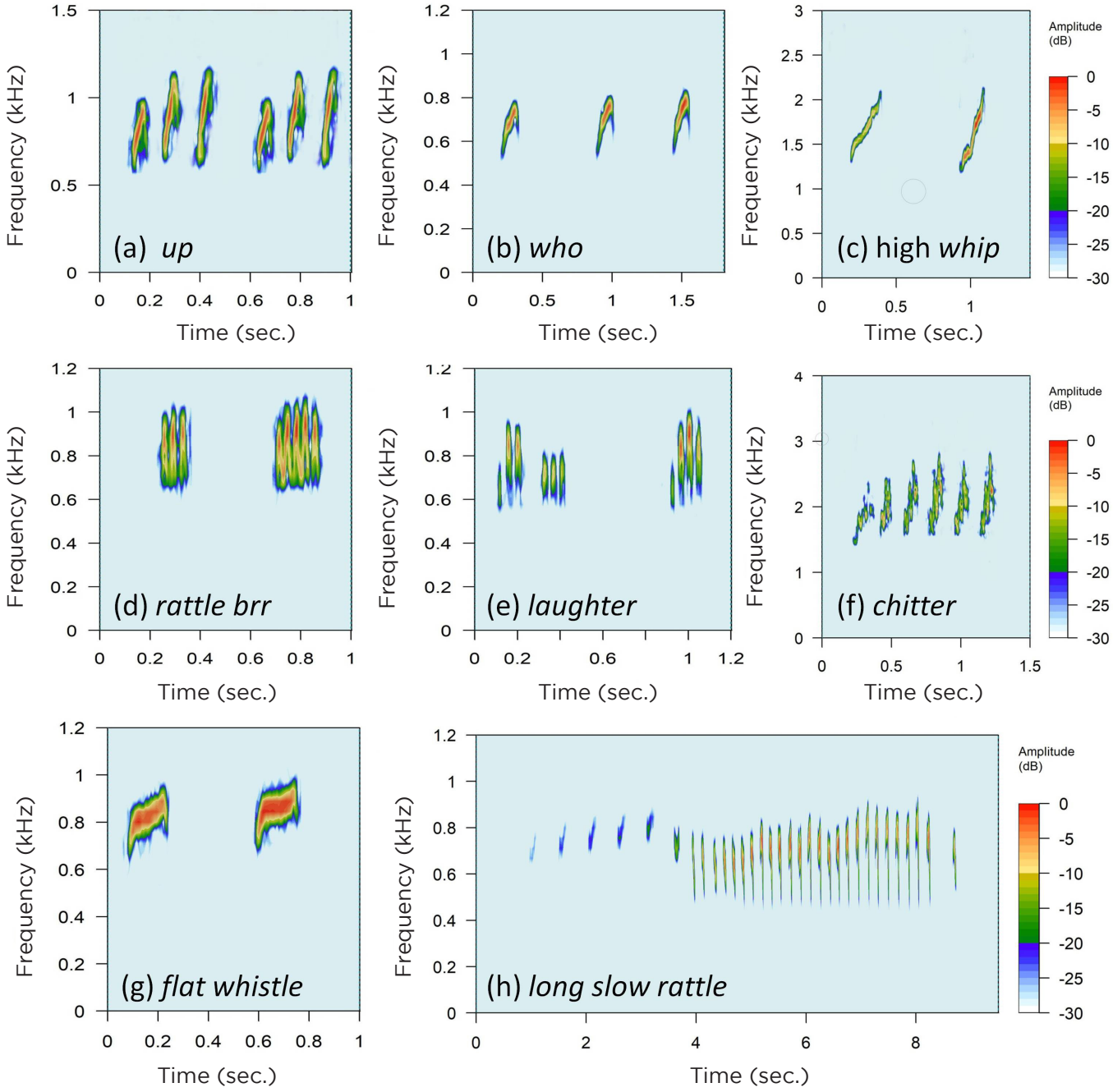

Figure 5. Spectrograms of vocalisations of Painted Button-quail identified as *clucks* associated with foraging behaviours, as described in Table 4. Note that the scale is consistent on the *y* axis (kHz) but varies on the *x* axis (seconds).

As suggested by Debus (1996), we believe that these contact calls are probably short-range communications and are likely given by all species of button-quail. Two broad categories of contact calls are described in our research and these were associated with territoriality or passive foraging behaviours. The contact calls in response to call-playback of the advertising *oom* appear similar to those described for the Chestnut-backed Button-quail (Webster *et al.* 2021), though those of the Painted Button-quail are slightly lower in pitch. A different repertoire of contact calls associated with foraging behaviours was recorded for the Painted Button-quail; the birds appear to be highly vocal, giving nearly continuous soft contact calls. Given this species' environment, visual contact with conspecifics is likely very difficult to maintain, and soft vocalisations such as those described here may be used to maintain contact.

The Painted Button-quail may be sympatric with the Buff-breasted Button-quail (Marchant & Higgins 1993; Smith & Mathieson 2019). Being such a cryptic group of birds (Yarwood *et al.* 2019), the ability to separate these species' vocalisations is critical. Based on calls of a suspected Buff-breasted Button-quail, Smith & Mathieson (2019) proposed that these two species have an almost identical call, with that of the Buff-breasted Button-quail only slightly lower in frequency, meaning that confusion between the two may occur. Compared with the descriptions of Smith & Mathieson (2019), the vocalisations of the Painted Button-quail described by us are nearly identical. Debus (1996) suggested that sympatric species of button-quail have advertising *oom*s that differ in pitch or tempo or both, and this remains true for known vocalisations of other Australian button-quail species; why the Buff-breasted Button-quail

Table 4. Descriptions and parameters of vocalisations of Painted Button-quail identified as contact calls associated with foraging behaviours. Values are displayed as mean ± standard deviation and range (in parentheses); *n* = number of recordings analysed.

Vocalisation	*Description*	*Duration (sec.)*	*Peak frequency (Hz)*	*No. elements*	*Comments*
Up (Figure 5a)	Short *cluck* that rises rapidly in pitch.	0.11 ± 0.09 (0.04–0.5) *n* = 47	889 ± 147 (780–1576) *n* = 47	1, occasionally in group of 2–3	Similar to *U* call but does not drop in pitch at end. Typically given singly but occasionally in rapidly repeated series of 2–3 elements.
Who (Figure 5b)	Short whistle that rises rapidly in pitch to an apex and typically drops to its starting frequency of ~700–1600 Hz. Occasionally has overtone ~100–200 Hz higher.	0.11 ± 0.12 (0.04–0.9) *n* = 50	1115 ± 420 (619–1988) n = 50	1, occasionally in groups up to 5	Typically given as single element but may be given in quick succession ≤5 times. Sounds like quick *who*. Appears in a spectrogram like inverted U.
High whip (Figure 5c)	Up-slurred whistle given singly or in repetition. Single element starts low (~1000 Hz) and rises rapidly in pitch to ~2200 Hz. Amplitude consistent throughout.	0.20 ± 0.03 (0.12–0.23) *n* = 13	1604 ± 184 (1350–1867) n = 13	1	Similar to *low whip* (aggressive *cluck*) but at higher frequency.
Rattle (*brr*) (Figure 5d)	Rapid rattle of ~6 elements repeated at rate of ~35/sec.	0.17 ± 0.04 (0.07–0.25) *n* = 37	818 ± 36 (764–927) *n* = 37	6.00 ± 2.37 (2–10) *n* = 37	Similar to *chitter* but each element is composed of individual rapidly repeated elements. Sounds like *brr*.
Laughter (Figure 5e)	Short rattle of 3–5 elements repeated at rate of ~25 elements/sec.	0.14 ± 0.05 (0.10–0.22) *n* = 7	1143 ± 360 (836–1572) *n* = 7	4–5	Similar to *rattle* (*brr*) but given at slower rate. Similar to fast *chatter* but at higher pitch.
Chitter (Figure 5f)	Series of repeated short strongly modulated rising trills repeated in quick succession for ~6 repetitions. Each element fluctuates in pitch, typically with 3 peaks and 2 troughs, from ~1100 to 3000 Hz.	0.24 ± 0.28 (0.08–1.12) *n* =25	920 ± 226 (668–1462) *n* = 25	5 or 7	Similar to *rattle* but each element is composed of a modulating *whistle* not individual elements.
Flat whistle (Figure 5g)	Short whistle similar to *whip* but frequency does not rise as rapidly. Rises slightly in pitch throughout whistle but drops at end.	0.17 ± 0.02 (0.12–0.20) *n* = 23	820 ± 133 (672–1136) *n* = 23	1	Given in series followed by *whip*.
Long slow rattle (Figure 5h)	Begins as series of *slow whips* that increase in pace and transition to faster series of deeper honk-like *clucks*.	8.05 ± 2.91 (5.24–11.72) *n* = 5	615 ± 68 (543–693) *n* = 5	31.4 ± 14.21 (17–54) *n* = 5	Individual notes are discernible initially but then speed up to a *trill*.
Nasal	Single low nasal *oom*-like element with many harmonics.	0.16 ± 0.02 (0.14–0.18) *n* = 3	240 ± 2 (238–241) *n* = 3	1	

would produce a vocalisation indistinguishable from the Painted Button-quail is perplexing. McLennan (1922) described the vocalisation of the Buff-breasted Button-quail, from a specimen he later shot and collected (NMV-HLW5045), as "oomm, oomm, oomm repeatedly rapidly", a vague description that could describe a vocalisation similar to that of the Painted Button-quail, but could similarly describe a vocalisation more akin to that of the Chestnut-backed Button-quail. Given the extreme rarity of the Buff-breasted Button-quail and the apparent urgency to determine that species' conservation status (Webster *et al.* 2022), further investigation into the identity of the vocalisation presented by Smith & Mathieson (2019) is required. The vocalisations provided in the present paper of Painted Button-quail in North Queensland provide a useful baseline for comparison.

The advertising *oom* call is the most readily detected of all vocalisations given by the Painted Button-quail. We believe that it is likely to be the most useful in detecting and identifying the species. It is anticipated that the visual representations and spectral parameters provided here will assist in identification of Painted Button-quail at different locations and allow comparisons with other species of button-quail.

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