Little Wood Rail *Aramides mangle* in the Caatinga: vocalisations and habitat

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Vocalizações de *Aramides mangle* foram gravadas, e aves vocalizando foram observadas e fotografadas durante o início da estação chuvosa de 2009 em hábitat de Caatinga, na reserva Mãe-da-lua, interior do Estado do Ceará, no nordeste do Brasil. O canto consiste em uma série de sílabas curtas, repetidas uma a três vezes por segundo. O volume, os componentes harmônicos, a duração da vocalização e outras características são variáveis. O principal elemento da sílaba é geralmente uma nota complexa, de freqüência e amplitude modulada, com a fundamental entre 0,5 e 2,5 kHz. Frequentemente, duetos podem ser ouvidos. Uma vocalização diferente consiste em uma série de sons simples e breves, com uma freqüência de aproximadamente 0,2 kHz, e baixa intensidade. Os dados indicam que na estação chuvosa, *A. mangle* ocorre e se reproduz no semi-árido do nordeste. Isto confirma um relatório de Lima *et al*.[10], sobre ninhos de *A. mangle* na Caatinga da Bahia, e contradiz a difundida visão de que *A. mangle* é essencialmente um especialista de manguezais e lodaçais.

The range of Little Wood Rail *Aramides mangle* extends from Paraná in southern Brazil to Pará in the north[3,11,14,16,21]. The species is mostly observed in coastal mangrove, swamps and adjacent forests[14,21]; there are also a few records from the interior of the north-east states of Ceará and Bahia[7,10,15]. Very little is known about its biology, and its voice is undescribed[23]. Lima *et al*.[10] remarked that local people from Jeremoabo, Bahia, consider *A. mangle* to be mute and deaf! In contrast, Grey-necked *A. cajanea*, Slaty-breasted *A. saracura* and Giant Wood Rails *A. ypecaha* possess loud strident songs that are regularly heard, mainly at dawn and dusk[21], making it remarkable that the voice of *A. mangle* is unknown. As Little Wood Rail inhabits dense vegetation and is rarely seen, knowledge of its voice would greatly facilitate understanding of its distribution and abundance. In late 2008, there was a discussion on www.xeno-canto.org (forum 998) concerning a bird vocalisation of an unidentified species in *caatinga*, which D. F. Lane suggested could be the song of *A. mangle*. On 25 February 2009, at Mãe-da-lua reserve, Ceará, I sound-recorded the song of Little Wood Rail and photographed a singing individual.

Study site and Methods

The study site, Mãe-da-lua reserve (03º48'41"S 39º28'25"W), is a private property of 769 ha in Itapajé municipality, Ceará, north-east Brazil. The lowlands of the interior of Ceará, including much of Mãe-da-lua reserve, form part of the semi-arid Caatinga biome, which covers most of north-east Brazil, and is characterised by a short and erratic wet season and long dry season, and occasional droughts of 1–3 years. In the *caatinga* of Ceará, the wet season extends from January / February–May / June, with mean precipitation of 500–850 mm p.a., varying regionally (Itapajé: 850 mm p.a.)[8]. Over the rest of the year, there is nearly no rainfall. Most rivers, lakes and reservoirs dry up, and conditions become harsh for many plants and animals[1,12,17,20].

In 2009, I spent at least 1–2 mornings or afternoons per week in the reserve to study the avifauna. The habitat where my observations of *A. mangle* were made consists of c.400 ha of secondary *caatinga* vegetation in various stages of regrowth, between three and 25–30 years old, with two permanent waterholes, and two reservoirs (one permanent). Vegetation is not uniform, because of variations in previous use, recovery period, soil characteristics, etc. Fig. 2 shows the vegetation at a site where Little Wood Rail was found. It consists of small trees, 3–8 m tall, cacti, bushes and grasses. Based on the older trees, I estimate the vegetation here to have been largely undisturbed for ≥20 years. In other areas where *A. mangle* was observed, the vegetation was of the same age or younger (4–20 years old). Common trees included *Ximenia americana*, *Chloroleucon dumosum*, *Myracrodruon urundeuva*, *Caesalpinia pyramidalis*, *Ziziphus joazeiro*, *Caesalpinia ferrea*, *Mimosa tenuiflora*, *Croton sonderianus*, *Combretum leprosum*, *Auxemma oncocalyx*, *Mimosa caesalpiniifolia* and others[18].

Bird voices were recorded with a Marantz PMD 671 digital recorder and Sennheiser ME64 microphone, with a sampling rate of 44.1 kHz (16 bit). For playback, I used an iPod and a small portable loudspeaker. Photographs were taken with a Canon 20D digital camera and F2.8L 300-mm lens. Sonograms were compiled using Raven Pro V1.4 beta for Linux (Cornell Lab of Ornithology).

Results and Discussion

Species identification Early on 25 February 2009, I heard a song similar to that in Fig. 1 in Mãe-da-lua reserve. Using playback, I soon observed a wood rail approaching, then singing on a tree-trunk c.1 m above ground. Identification to species was impossible due to poor light. That afternoon, I used playback at the same place and a wood rail appeared within ten minutes. It was photographed (Fig. 3a) and its vocalisations recorded (Fig. 6). On 1 March 2009, the experiment was repeated, with similar results (Fig. 3B). The bird was identified as *A. mangle*, based on the rufous foreneck and the intense orange-red at the base of the maxilla[2,11,21,23].

Vocalisations At Mãe-da-lua reserve I made 26 sound-recordings during 12 different visits in February 2008 and January–March 2009. These recordings probably represent at least two birds (or pairs), with territories in different locations. Representative samples are available for download, in mp3 format, at http://www.birds-caatinga.com/downloads_cotinga_01.

Natural song of lone birds.—Little Wood Rail sings mostly early morning and evening, or after rain, either alone or in pairs (see next section). The song is a series of syllables, repeated at a constant rate. Comparison between different recordings reveals some variability in syllable structure and repetition rate, loudness, duration and other characters. Examples of the solo song appear in Figs. 1 and 4. That in Fig. 1 comprises 36 syllables, lasting 14 seconds, at a rate of 2.6 repetitions per second (Fig 1A). Syllable structure changes during the song. The sonogram reveals that initially the frequency range is disjointed, but that it becomes more continuous (Fig. 1B), which change is easily perceptible to the human ear. The vocalisation in Fig. 4 is slightly different, as the first syllable sounds unlike the rest. The song's duration is seven seconds, with a repetition rate of 2.3 syllables per second. This song was followed a few seconds later by another song, also with the first syllable different from the rest but twice as long. In both examples, there are relatively few harmonic components (unlike Fig. 6). The period between syllables is largely constant, i.e. there is no perceptible change of speed. Individuals singing alone mostly show a repetition rate of 2–3 syllables per second, but in a few cases the rate was less (e.g. 1.5 per second). I have no recordings with repetition rates <1 or >3 syllables per second. Sound intensity also varies. Sometimes, the level appeared rather low, even when the bird was just 5–10 m away. On other occasions, for instance when a bird apparently tried to communicate with another far away, or during playback or in duets (see below), songs were much louder.

Duets.—These were often heard. The voices alternate, and sometimes overlap, in a strikingly irregular fashion, due to different syllable repetition rates in the two simultaneous songs. One bird would sing at a rate >2 repetitions per second (inter-syllable periods <0.5 seconds), and the other at a rate of c.1.5 per second (periods 0.6–0.8 seconds); cf. Fig. 5. It is unknown whether duets are always given by mated pairs and if the different repetition rates can be related to sex. Duets are described for several Rallidae[22,24], presumably serving in territory maintenance and advertisement[23]; see Hall[6] for a critical review.

At least in the wet season, in the caatinga the song of single birds or pairs is the most commonly heard vocalisation of *A. mangle*, and readily identifies the species. Often, these vocalisations elicit a response from other singles or pairs. In March 2009, 1–2 birds sang nearly every evening near my house; presumably, this was a pair on territory. Singing is most frequent in the early wet season, but can also be heard in the following months. In 2009, in Mãe-da-lua, I heard the song as late as 11 August, c.2 months after the last major rainfall. See Taylor[23] for a review of the functions of rail songs.

Response to playback.—In response to playback, wood rails soon started to sing. Repeated playback elicited more vocalisations and the bird would move closer, up to 5–15 m distant. Several times, I then observed the bird on a tree trunk or a branch c.1 m above ground, and somewhat exposed (Fig. 3), producing very loud songs of variable length, from a few seconds to over a minute. In response to further playback, the vocalisations were repeated, from various positions, and were probably audible >1 km distant. They differed from spontaneous songs in their stronger harmonics and uniform syllables throughout (Fig. 6).

Low-frequency pips.—This low-intensity signal (Fig. 7) was sometimes noted when wood rails were a few metres distant. The sound is so faint that it is probably inaudible >10–15 m away. Possibly, it is used to warn nearby conspecifics in situations of perceived danger. Because of the low pitch, just above 0.2 kHz, these faint sounds might be inaudible to some predators, e.g. Aplomado Falcon *Falco femoralis* and other raptors with reduced hearing on low frequencies[9,25].

Systematics I compared the vocalisations of *A. mangle* to those of Rufous-necked Wood Rail *A. axillaris*, a morphologically similar species found on north-west and north coasts of South America[4,11]. For *A. axillaris* I used recordings by C. Vogt from Ecuador (www.xeno-canto.org, recording XC16369), by B. Walker from Peru[5], by J. C. Arvin from Ecuador[5], and by N. Krabbe, on 1 March 2005, from dry forest in Ecuador in response to playback. The

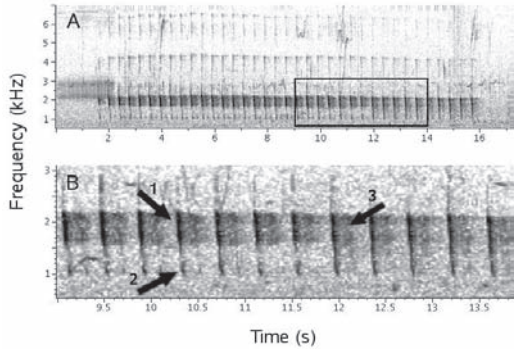

Figure 1. Song of a single Little Wood Rail *Aramides mangle*, recorded 29 January 2009, Mãe-da-lua reserve. No playback used. Sonogram parameters: Hann window size and DFT window size 2,048 samples, overlap 50%. The recording can be downloaded, see text. (B) is a detail from the boxed part of the sonogram shown in (A). Initially, the frequency range of the syllable is discontinuous, with a short down-sweep from c.2.2 to 1.5 kHz (arrow 1), and a brief sound just above 1 kHz (arrow 2). In the final part, the frequency range is more continuous, from c.2.2 to 1 kHz (arrow 3).

Figure 3. (A) Little Wood Rail *Aramides mangle*, singing during playback on 25 February 2009, Mãe-da-lua reserve. (B) This photograph was taken shortly after the bird stopped singing in response to playback, 1 March 2009, Mãe-da-lua reserve (Hermann Redies)

Figure 2. Caatinga in Mãe-da-lua reserve, during the early wet season 2010 (late February). The tree labelled 'Jc' is a *Caesalpinia ferrea*, surrounded by undergrowth and dead branches from a fallen *Mimosa tenuiflora*. A pair of Little Wood Rails *Aramides mangle* was often heard duetting in February 2010, mostly at dusk, in this area (Hermann Redies)

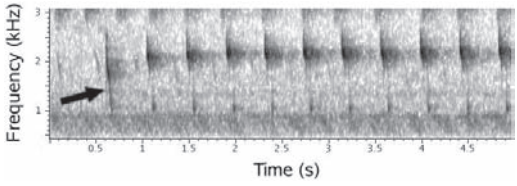

Figure 4. Initial part of song of lone bird, recorded 27 March 2009 in Mãe-da-lua reserve. No playback used. Sonogram parameters: Hann window size and DFT size 1,024 samples, overlap 50%. The arrow points to the first syllable, which has a continuous frequency range from c.2.6 kHz to c.1 kHz, and differs from the following syllables, which have a discontinuous frequency range as in Fig. 1B, arrows 1 and 2. There is a slight increase in pitch over the initial four syllables. The recording can be downloaded, see text.

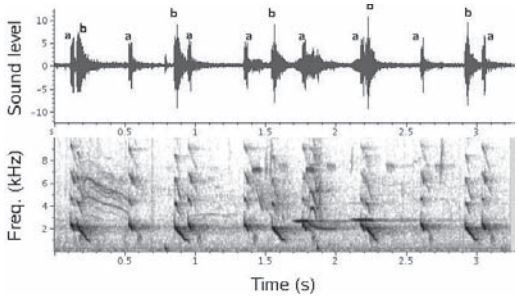

Figure 5. Extract from a duet, 20 January 2009, Mãe-da-lua reserve. Sonogram parameters: Hann window size and DFT size 512 samples, overlap 50%. Considered together the waveform plot (above) and sonogram (below) permit the sounds in the duet to be attributed to either bird (a) or bird (b). For bird (a), the period between syllables is c.0.42 seconds and for bird (b) c.0.68 seconds. This difference between the inter-syllable periods results in the strikingly irregular acoustic pattern of the duet. The recording can be downloaded, see text.

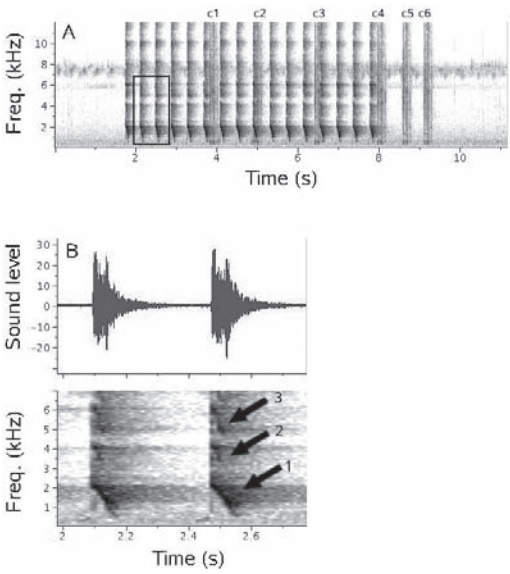

Figure 6. Song recorded after playback. 25 February 2009, Mãe-da-lua reserve. Sonogram parameters: Hann window size and DFT size 1,024 samples, overlap 50%. The recording can be downloaded, see text. (A) Sonogram: the syllable repetition rate is 2.5 per second; labels 'c1' to 'c6' denote the camera shutter. The song exhibits far more prominent harmonics than songs in Figs. 1 and 4. (B) Detail of two syllables (boxed area in A); waveform above, sonogram below. The syllable has a complex structure, but the dominant element is a loud frequency sweep (arrow 1) of c.100 milliseconds duration, from 2 kHz to 0.5 kHz. Harmonic components (arrows 2 and 3) are much shorter than the loud down-sweep, suggesting a complex sound-generating mechanism.

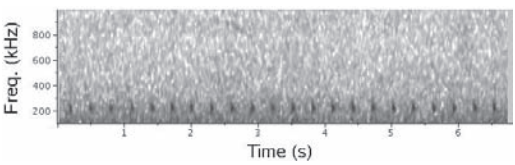

Figure 7. Series of faint low-frequency pips, 1 March 2009, Mãe-da-lua reserve. Sonogram parameters: Hann window size and DFT size 2,048 samples, overlap 50%. The recording can be downloaded, see text.

songs of *A. mangle* and *A. axillaris* are very similar. The limited material for *A. axillaris* is insufficient for conclusive analysis, but supports the suggestion that the two species are close relatives, and may belong to the same superspecies (P. Boesman on www.xeno-canto.org, forum 998) or are even races of the same species[7].

Distribution and migration There are only four other sites in the interior of north-east Brazil

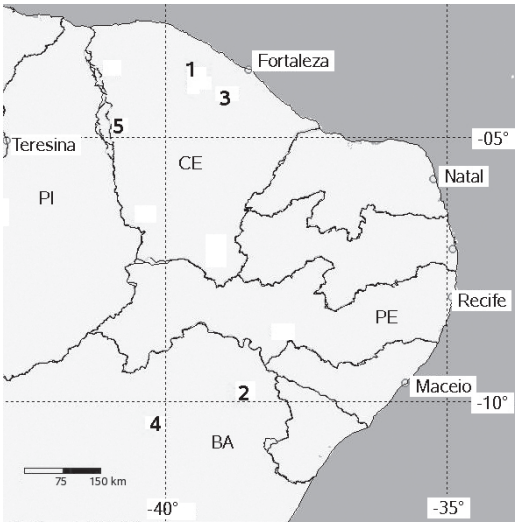

Figure 8. Map of north-east Brazil: nos. 1–5 mark inland locations for Little Wood Rail *Aramides mangle*; sites (4) and (5) were mapped using a gazetteer[13]. (1) Mãe-da-lua reserve, Itapajé, CE, see text. (2) Água Branca, Jeremoabo, BA[10]. (3) Baturité, CE[15]. (4) Senhor do Bomfim, BA[14]. (5) Arara, Ipaporanga, CE[7]. Abbreviations: BA = Bahia, CE = Ceará, PE = Pernambuco, PI = Piauí

with published records of Little Wood Rail (Fig. 8, locations 2–5). In one, the habitat is *caatinga* (Jeremoabo, Bahia[10]). In the others, there is no detailed information but the habitat was perhaps different, e.g. dry montane forest (Arara[7]) or humid montane forest or swamp (Baturité[15]). Possibly, the presence of *A. mangle* in this region has been under-estimated in the past because the species is rarely seen in the open and its voice was unknown. I suspect that vocal records of *A. mangle* in the region will multiply in the future. At Mãe-da-lua reserve, for example, I was initially unaware of the presence of *A. mangle*, but in the wet season of 2009, with the benefit of vocal recognition, I estimated that there were 6–20 individuals.

It is currently unknown whether the species is a permanent resident in semi-arid regions of north-east Brazil, or whether the birds perform regular or sporadic short-range movements to more humid habitats, e.g. coastal mangroves or inland or coastal swamps. In the Caatinga, rainfall is erratic and droughts are common. Sporadic migrations, with no rigid temporal or spatial pattern, would be an efficient adaptation to the unpredictability of this environment. Erratic dispersal behavior has been described in other rallids[19].

Breeding and habitat Territorial songs, duets and strong reaction to playback indicate that *A. mangle* breeds in the semi-arid interior, in the wet

season. I did not find a nest, but in May–July 2009, I twice saw half-grown individuals in a small family group (1–2 adults, 2–4 young), foraging beside a small temporary stream. The young appeared to have adult-like colours, although the observations were brief. On 31 May 2009, I saw a Little Wood Rail with adult-like plumage, apparently alone, on a small tree, which I approached to within 3–4 m. I believe it too was a juvenile, because of its size and clumsy movements. There is a single previous report of breeding by *A. mangle* in *caatinga*, at Jeremoabo, Bahia[10]. My observations from the *caatinga* of Ceará confirm this report, and further contradict the traditional view that *A. mangle* is solely a swamp and mangrove specialist[16,21,23].

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