

## Notes on the vocalizations of xxx

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In the following we briefly analyze and compare voice of the different races of xxxx. We also try to quantify the extent of any vocal differences using the criteria proposed by Tobias *et al.* (2010), as a support for taxonomic review.

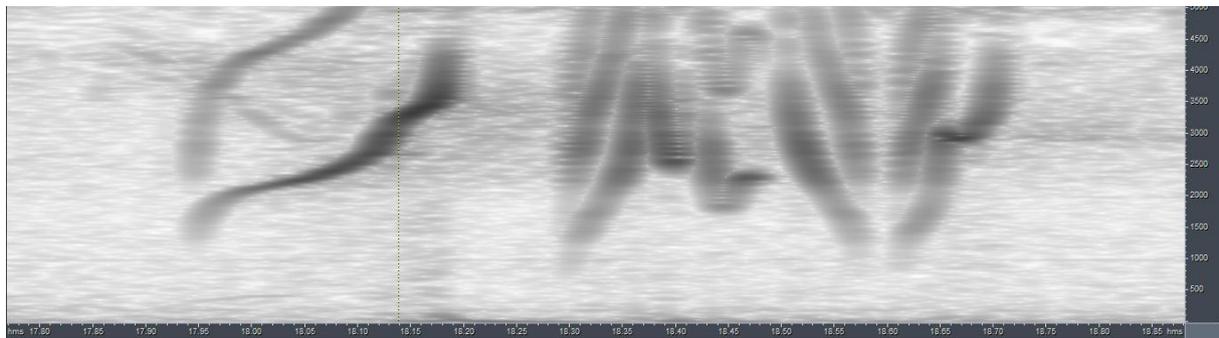
We have made use of sound recordings available on-line from Xeno Canto (XC) and Macaulay Library (ML).

### 1. Dawn song

With respect to dawn song, there are two groups which clearly differ. We have examined all available dawn-songs to see which taxa belong to which group.

#### **Group 1:** dawn song with high-pitched rising end note

Dawn song is remarkably similar over its entire range: a first upslurred note which starts at fairly high frequency, a high-pitched overslurred note, a low-pitched underslurred note, a high-pitched down-slurred note and a rising note with bend at high pitch.



The following races have this dawn song type:

*M. m. insolens* no recordings

*M. m. difficilis* 3 recordings from Panama and W Venezuela

*M. m. nobilis* 1 recording presumably of this taxon from Santander, Colombia.

*M. m. tobagensis* 2 recordings from Bolivar, Venezuela and Guyana

*M. m. chapmani* 5 recordings from W Ecuador and NW Peru

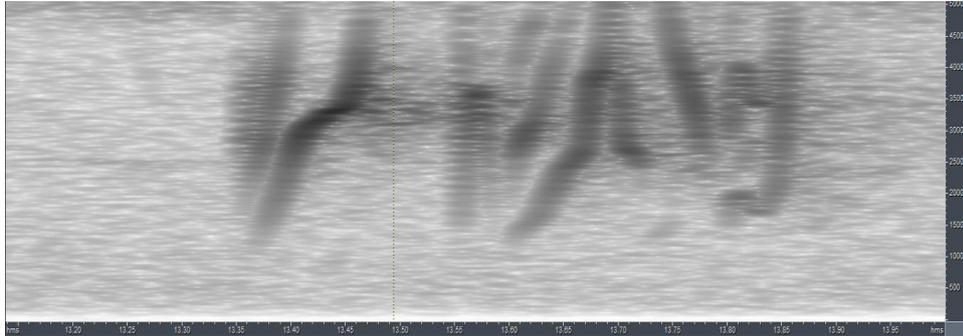
*M. m. maculatus* no recordings

#### Measurements:

total length	0.67-0.85s
min.freq. first note	1300-2300Hz (typically around 1900Hz)
bend freq. last note	3100-3700Hz

#### **Group 2:** dawn song with low-pitched end note

Dawn song over its entire range is a first upslurred note which starts at fairly low frequency, a short low-pitched overslurred note, a long high-pitched overslurred note, a high-pitched down-slurred note and a rising note with bend at low pitch.



The following races have this dawn song type:

*M. m. solitarius* 12 recordings from SE Peru, Argentina, Bolivia and Brazil

1 recording from eastern foothills of C Peru presumably this taxon (or *maculatus*??)

Measurements:

total length	0.48-0.58s
min.freq. first note	780-1140Hz
bend freq. last note	1450-2050Hz

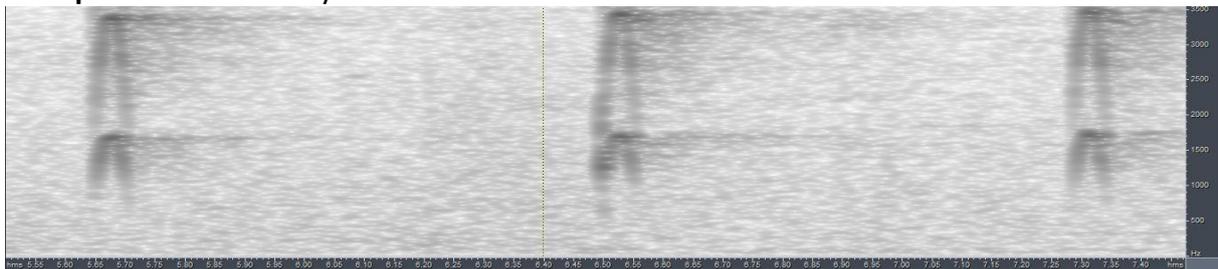
In comparison with group 1, it is clear that the total song phrase is significantly shorter (score 2-3), that there are several frequency related differences such as min.freq. first note and bend freq. last note (score 3). The overall pattern of the 5 notes is also quite different, with e.g. note 2 and 3 very different (score 2). When applying Tobias criteria this would lead to a total vocal score of about 5.

**2. Day-time call**

The commonest vocalization given during the day is a repeated emphatic short note.

At closer examination, it is clear that there are again 2 vocal groups: one groups has a nasal note which is nicely overslurred "kuk", the other group has a less nasal note which is clearly upslurred "quit".

**Group 1: overslurred day-time call**



The following races have this dawn song type:

*M. m. insolens* 3 recordings (sometimes with an additional long note, not seen in other races)

*M. m. difficilis* 6 recordings from Panama, Colombia and W Venezuela

*M. m. nobilis* 2 recordings

*M. m. tobagensis* 8 recordings from Venezuela

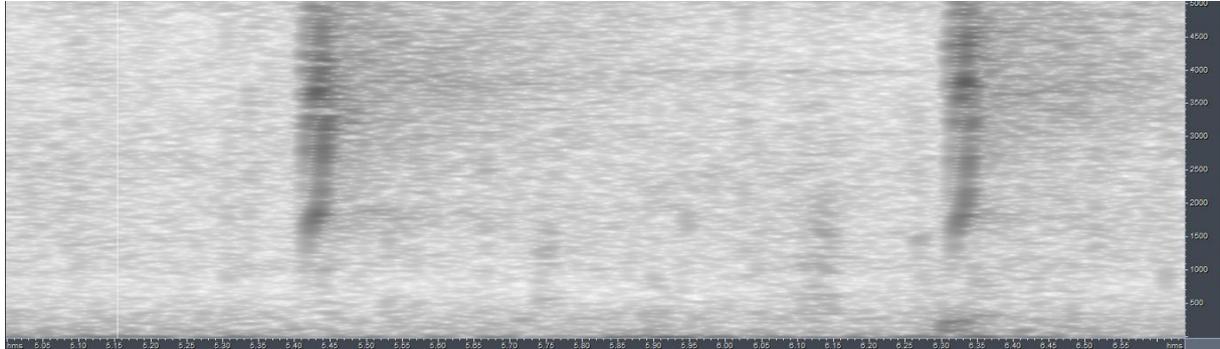
*M. m. chapmani* 8 recordings from W Ecuador and NW Peru

*M. m. maculatus* 3 recordings from Boa Vista, Manaus in Brazil, (and Loreto, Peru also this taxon?)

Measurements:

total length	0.05-0.07s
min.freq.	700-940Hz
max. freq.	1600-1940Hz
freq. range	800-1150Hz

**Group 2:** upsurred day-time call



The following races have this dawn song type:

*M. m. solitarius* 10 recordings from SE Peru, Argentina, Bolivia and Brazil  
1 recording from eastern foothills of C Peru presumably this taxon

**Measurements:**

total length	0.04-0.057s
min.freq.	800-1300Hz
max. freq.	3000-3500Hz
freq.range	1900-2400Hz

Interestingly the dividing line between the 2 vocal groups is again *solitarius* versus all other races !

Differences in day-time call can be quantified as follows: freq. range and max. freq. of *solitarius* is much higher than the other group (score 3-4), with different note shape (score 1-2). Total score vocal score about 5.

All together, the vocal difference of *solitarius* versus all other races is quite remarkable. If we would take the two highest scores out of the 2 vocalizations examined, this would give a score of at least 6.

This note was finalized on 20th August 2015, using sound recordings available on-line at that moment. We would like to thank in particular the many sound recordists who placed their recordings for this species on XC and ML.

**References**

Tobias, J.A., Seddon, N., Spottiswoode, C.N., Pilgrim, J.D., Fishpool, L.D.C. & Collar, N.J. (2010). Quantitative criteria for species delimitation. *Ibis* 152(4): 724–746.

**Recommended citation**

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