The Affect of Ambient Noise on Bluebird Songs

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Outline

- Background on similar research done before
- My research question
- Research method
- Analysis and results
- Interpretation and research in the future

Research Background

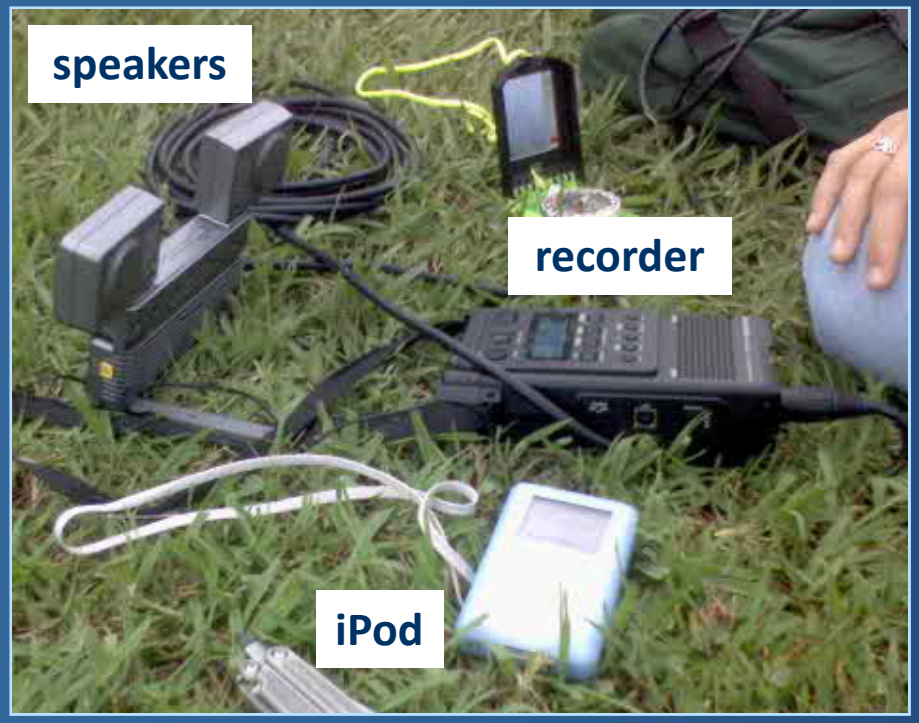
- Urbanization has certain affects on birds
- One aspect is the noise caused by human activities may mask the bird songs
- Birds sing to defend territory and attract mates
- Research has shown that birds adapt by adjusting the design of their songs
- Nightingales:
  Song amplitude is individually regulated according to the level of masking background noise (Brumm 2004)
- Little Greenbul:
  Frequencies of their songs are shown to differ between habitats due to the level of ambient noise (Slabbekoorn 2002)
- Evolutionary change may be occurring

My question

- How does the ambient noise in the bluebirds habitat affect their song, in terms of both frequency and amplitude?
- Expected:
  ambient freq. and amp. ↑
  → freq. and amp. of birdsongs ↑

http://www.nabluebirdsociety.org
http://www.learnbirdsongs.com

Method:
Recording Male Bird Songs



1. Play a bluebird song with the iPod at a bird-box.
2. Record when the bird in the area sings in respond.

Campus Boxes

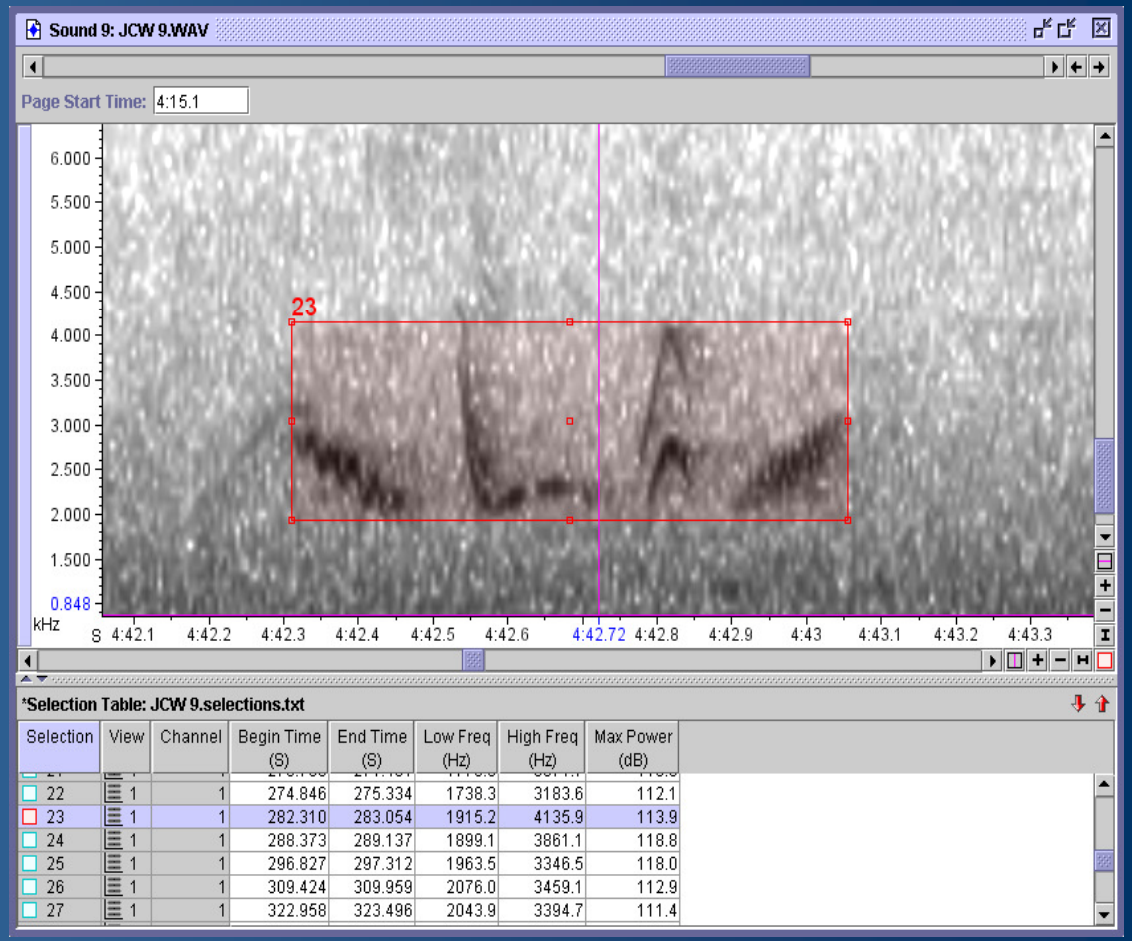
Other box locations: Dillard, ESH, JCW, SHS, YRSP; 12 boxes in total

Analysis: Raven

1. Digitize the recordings with Raven.

2. Dark marks
 = Male song patterns
 Grey fuzzy part
= Ambient noise

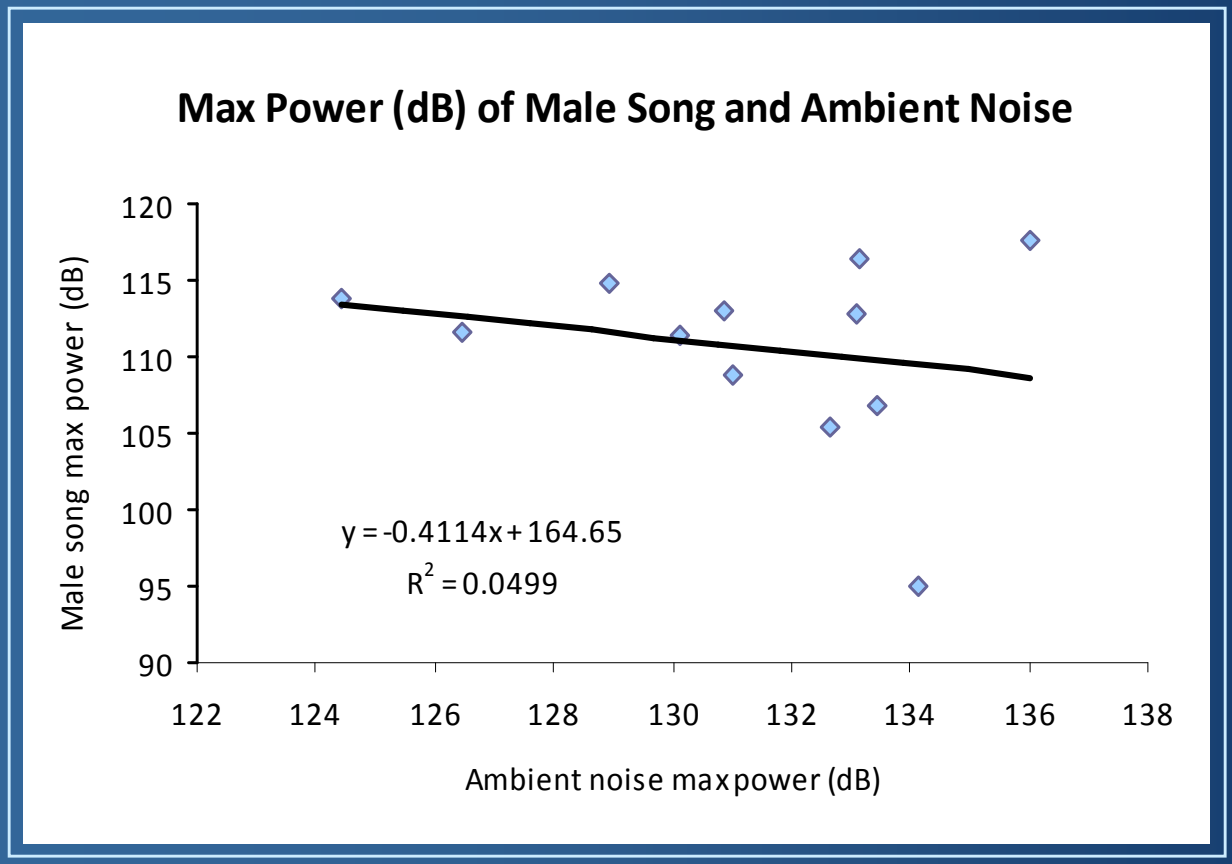
3. Collect freq. and amp. (shown as max power in table)



Selection	View	Channel	Begin Time (S)	End Time (S)	Low Freq (Hz)	High Freq (Hz)	Max Power (dB)
22	1	1	274.846	275.334	1738.3	3183.6	112.1
23	1	1	282.310	283.054	1915.2	4135.9	113.9
24	1	1	288.373	289.137	1899.1	3861.1	118.8
25	1	1	296.827	297.312	1963.5	3346.5	118.0
26	1	1	309.424	309.959	2076.0	3459.1	112.9
27	1	1	322.958	323.496	2043.9	3394.7	111.4

Results

1. Correlation between Amplitude of Male Songs and that of Ambient Noise

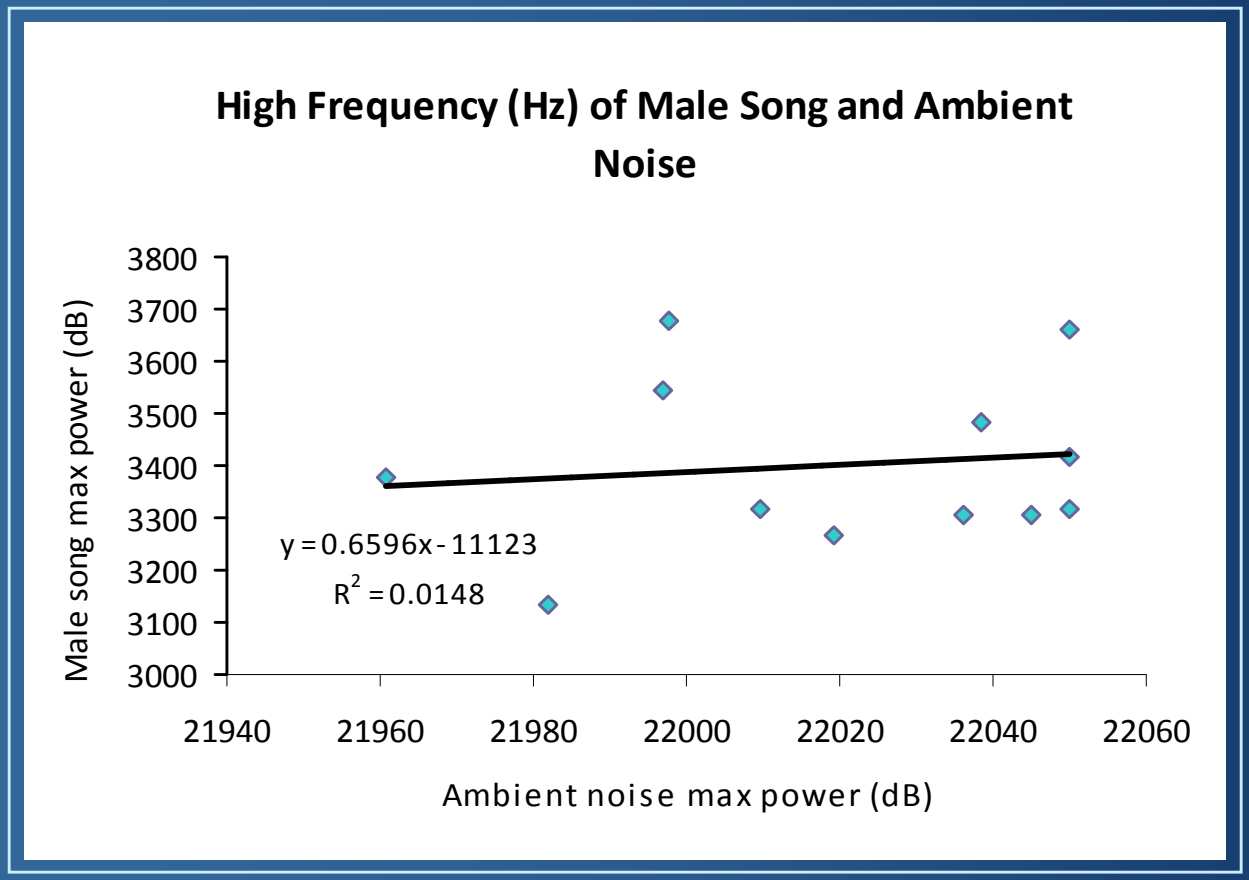


1. The trend line shows a negative relationship between the ambient amplitude and that of the male songs.

2. However, the R^2 value is small, so the trend line does not have significant representation.

Results

2. Correlation between High Frequency of Male Songs and that of Ambient Noise



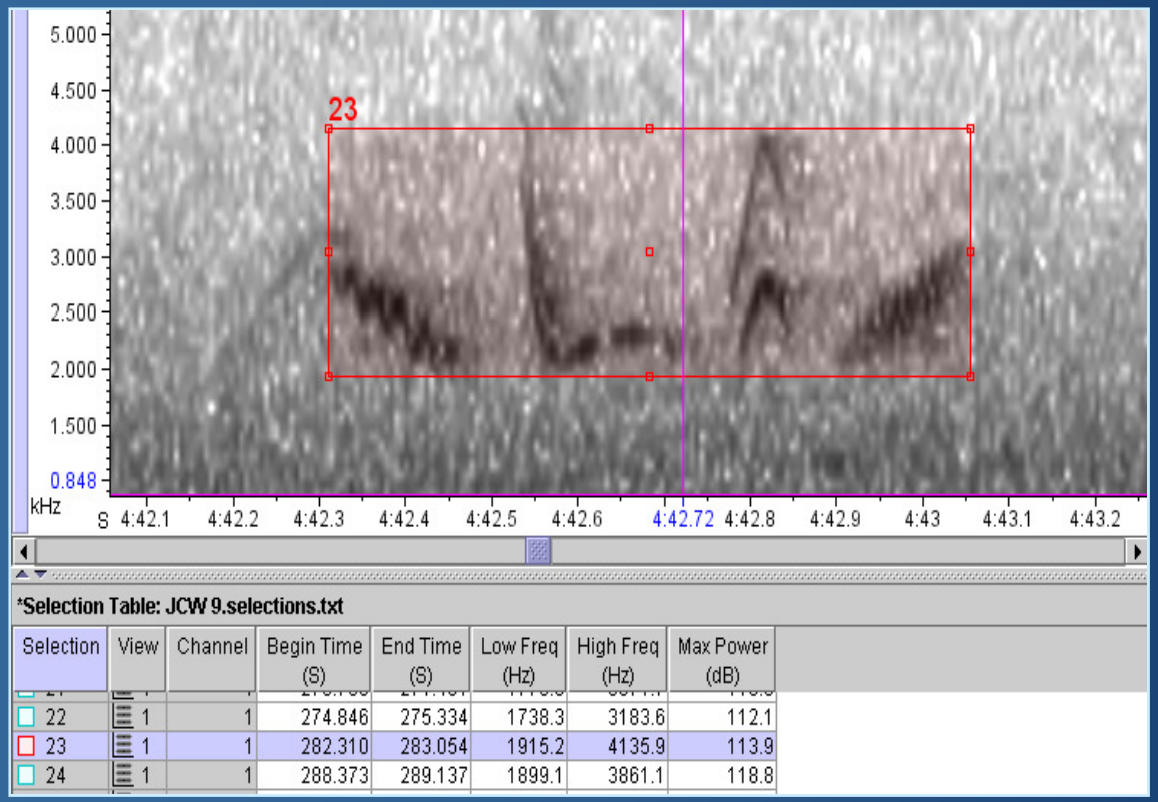
1. The trend line shows a slightly positive correlation between the high frequency of the male songs and that of the ambient noise.

2. However, again, the R^2 value is small, so there is no significant relationship.

Interpretations

Not the expected results: Male bluebirds do not seem to adjust their songs to the ambient noise

JCW 9



*Selection Table: JCW 9.selections.txt

Selection	View	Channel	Begin Time (S)	End Time (S)	Low Freq (Hz)	High Freq (Hz)	Max Power (dB)
22	1	1	274.846	275.334	1738.3	3183.6	112.1
23	1	1	282.310	283.054	1915.2	4135.9	113.9
24	1	1	288.373	289.137	1899.1	3861.1	118.8

Why?

1. I focused on the high freq. The birds probably adjust at lower freq. instead.
2. Amp. of male songs might probably be the loudest.

Male song high freq. & amp. ≈ 4,100 Hz, 110 dB

Ambient average high freq. & amp. calculated ≈ 22,000 Hz, 125 dB

Future Analysis

- Freq. range of ambient noise is very broad. Look at specific syllables that overlap with the ambient frequency and amplitude for a better comparison

References

Brumm H. 2004. Causes and consequences of song amplitude adjustment in a territorial bird: a case study in nightingales. Anais da Academia Brasileira de Ciências 76(2) 289-295.

Slabbekoorn H, Smith T. 2002. Habitat-dependent song divergence in the little greenbul: an analysis of environmental selection pressures on acoustic signals. Evolution 56 (9) 1849-1858.