Name: _____ Date: _____ Class/Period:_____

Lesson 9: Comparing Our Results

Activity 9.1 A Study of Song Sparrows and Urban Noise

Scientists around the world have been conducting research similar to the research you and your classmates have been conducting. For example, Esteban Fernedez-Juricic and his colleagues found male house finches in Los Angeles were raising the low frequency of their song in response to urban noise. They also found that these male house finches were reducing the number of notes they sang, hence shortening the message to be better heard, even though females are attracted to males with longer songs. Similarly, two scientists at Reed College in Oregon, William Wood and Stephen Yezerinac, examined the impact of noise pollution on song sparrows.

Predictions:

The researchers made three predictions:

1. Males occupying territories with higher noise levels (louder) will have songs with a higher low frequency (pitch)
2. Males occupying territories with higher noise levels will exhibit greater sound energy within the upper frequency portion of the song relative to the energy of the lower-frequency portion of the song. (In other words, males will sing higher pitch portions of their song louder than the lower pitched parts of their songs)
3. Maximum frequencies of male songs will not vary based on background noise levels since these are well above the frequencies of noise in the area.

Methods

Study Site: Data were collected in southeast Portland, Oregon. Song sparrows were found in habitats ranging from urban parks and roadside vegetation to residential yards.

Data Collection: The songs of 28 different male song sparrows were recorded. Researchers also measured the background noise level.

Data Analysis – Song Measurements: For each male, two songs were selected at random. To test their first and third predictions, the scientists measured the low and high frequency for each song. Below is an example from their paper of how they measured low frequency:

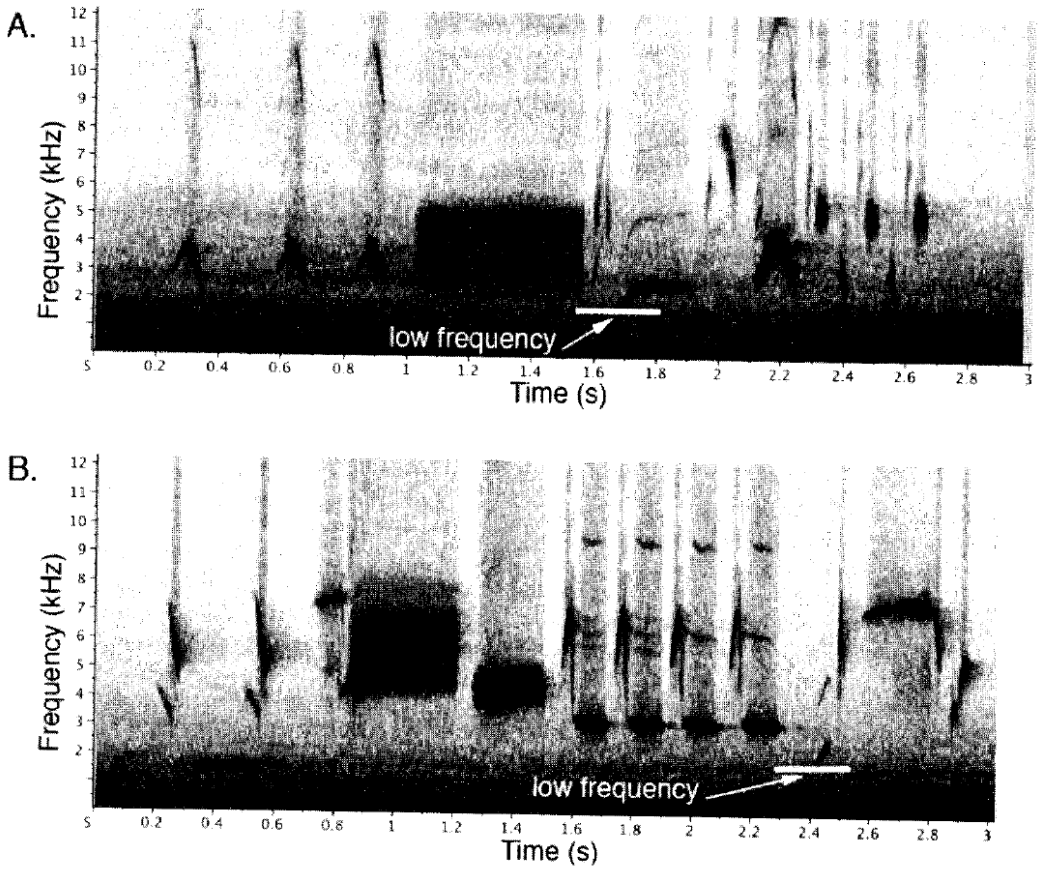


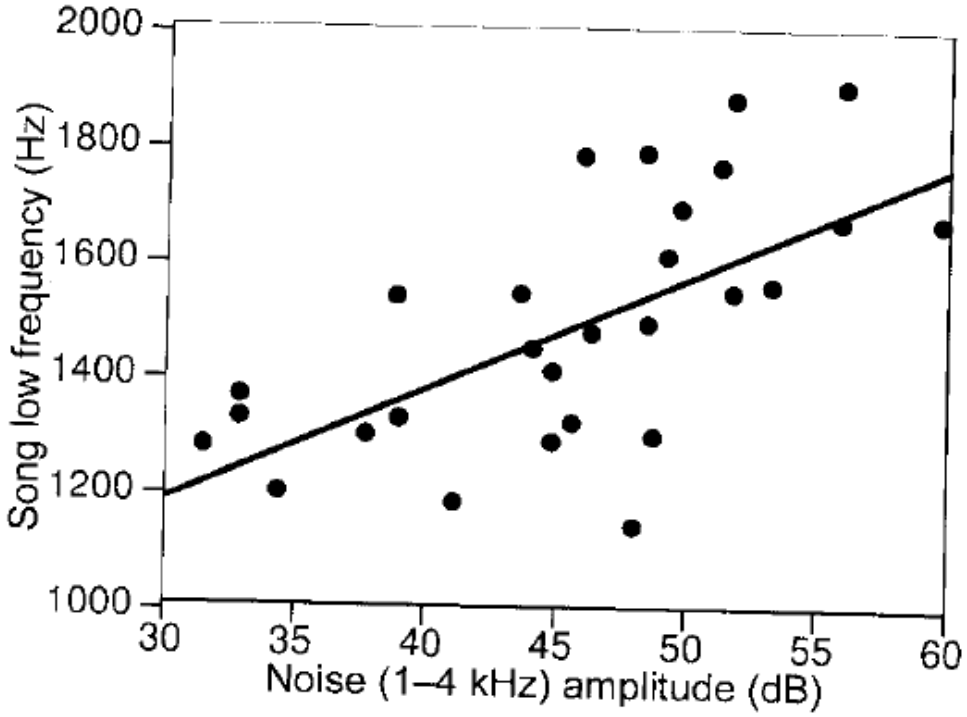
FIG. 1. The lowest-frequency notes sung are easily discernible in spectrograms of Song Sparrow songs from recordings with (A) the most low-frequency background noise and (B) the second-most low-frequency background noise encountered in the present study.

To test the second prediction, the songs were divided into low-frequency (1- 4 kHz) and high-frequency (4-9 kHz) ranges. The amplitude (or loudness) within each range was measured using a spectrogram analysis software, similar to RAVEN. This was measured in decibels. A ratio of low frequency amplitude to high frequency amplitude was calculated for each song. In other

words they divided the loudness of the low pitch potion of the song by the loudness of the high pitch portion of the song.

Data:
Researchers found high frequency of bird songs did not vary with noise level. Below is the data regarding the researchers' first prediction:

> ***Prediction #1:*** **Males occupying territories with higher noise levels (louder) will have songs with a higher low frequency (pitch)**

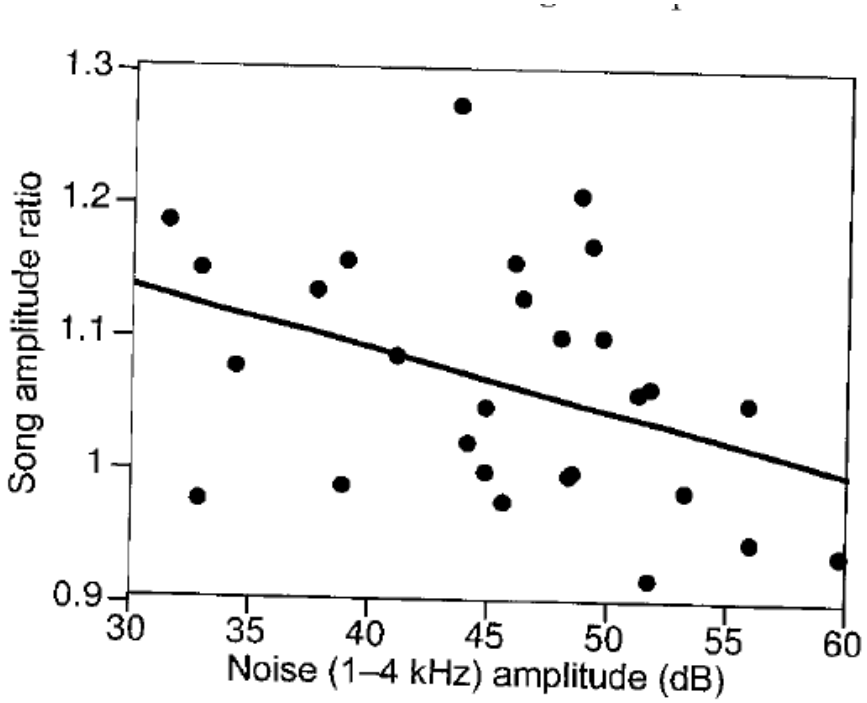


1. What does this graph tell you?

2. Does this data support or refute the scientists' first prediction? Why or why not?

Below is the data that relates to the researchers second prediction,

Prediction #2 **Males occupying territories with higher noise levels will exhibit greater sound energy within the upper frequency portion of the song relative to the energy of the lower-frequency portion of the song.**



3. What does this graph tell you? Remember, to get the song amplitude ratio, they divided the loudness of the low pitch potion of the song by the loudness of the high pitch portion of the song.

4. Does this data support or refute the scientists' second prediction?

Activity 9. 2. Comparing Wood & Yezerinac's study of song sparrows to our own study.

1. How was your research question and prediction similar to and different from the study above?

2. How was data collection similar to and different from the study above?

3. How was your data analysis similar to and different from the study above?

4. While a few studies have examined the impact of noise on bird communication, little is still known. If you were going to continue this research, what would you study? Describe your study below: