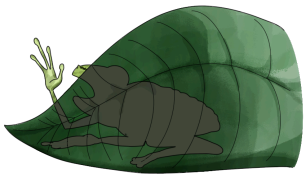
Tab 1

NAME: _____ DATE: _____ CLASS PERIOD: _____

Who will be the next top frog?

 Trevor	 Kermit	 Wert	 Unknown

Part 1. Performance thresholds.

✎ **Instructions.** Watch the first part of the video in the Google Slides presentation and answer the following questions.

1. What is a performance threshold? Give an example from everyday life or biology.

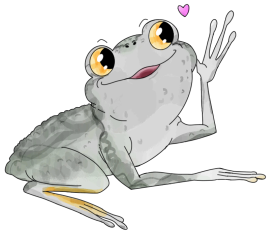
2. Think about the definition of tradeoffs we discussed in the last lesson, balancing risks and benefits. Write down one tradeoff example you discussed in class from everyday life, animals, or plants.

3. How do performance thresholds relate to the concept of natural selection?

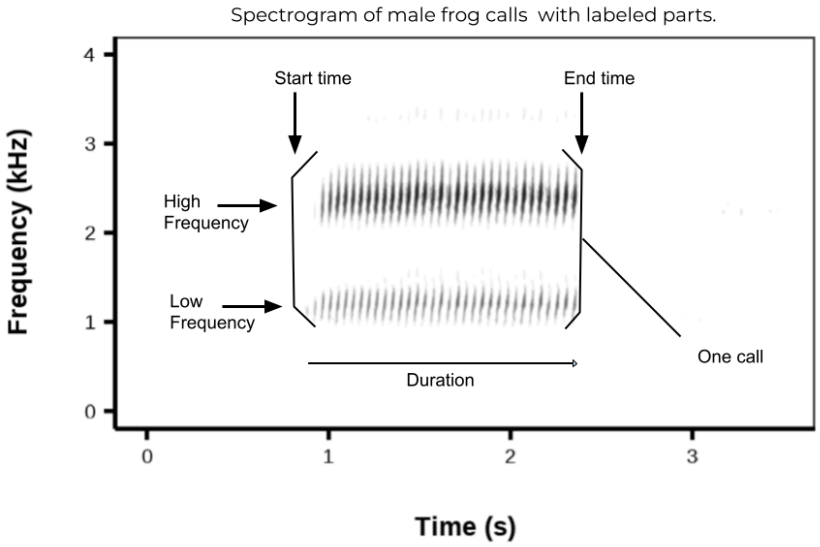
4. What are some reasons frogs would call (vocalize)?

Part 2. Spectrograms

i Spectrograms are visualizations (like a graph) that show how frequency of sounds in a recording change over time. Spectrograms are a key tool for scientists, musicians, and audio engineers to understand sound by seeing what we can normally only hear.



Female frogs listen to male calls to choose the best mate.



ℹ We are going to analyze the spectrograms on the next page for **average call duration** and **call rate**. These variables measure how much effort males put into their calls, which helps females judge their quality.

⏱️ **To get average call duration, we first need to calculate durations of each call:**

1. Look at the numbers at the top of each call to see when it started and stopped.
2. Subtract the start time from the finish time.
3. Record the duration

Ex: for the first call in Figure 1:
2.35 - 1.02 = 1.33 seconds
Enter 1.33 seconds for "**duration**" in the data table on page 5. Continue subtracting the start times from the end times for the whole data table.

🐸 **Call rate is a measure of speed.** Your car's speed is measured in miles per hour; a frog's call rate is measured in calls per second.

Calculating Call Rate: count the number of calls in each Figure on the spectrogram handout. Divide the number of calls by the number of seconds (in this case, 30 seconds).

Ex: The frog "Trevor" in Figure 3 has **6 calls in 30 seconds. 6 calls/ 30 seconds = 0.2 calls/ second.** Write the 0.2 calls/second in the last column (labeled "Call Rate") in the data table below.

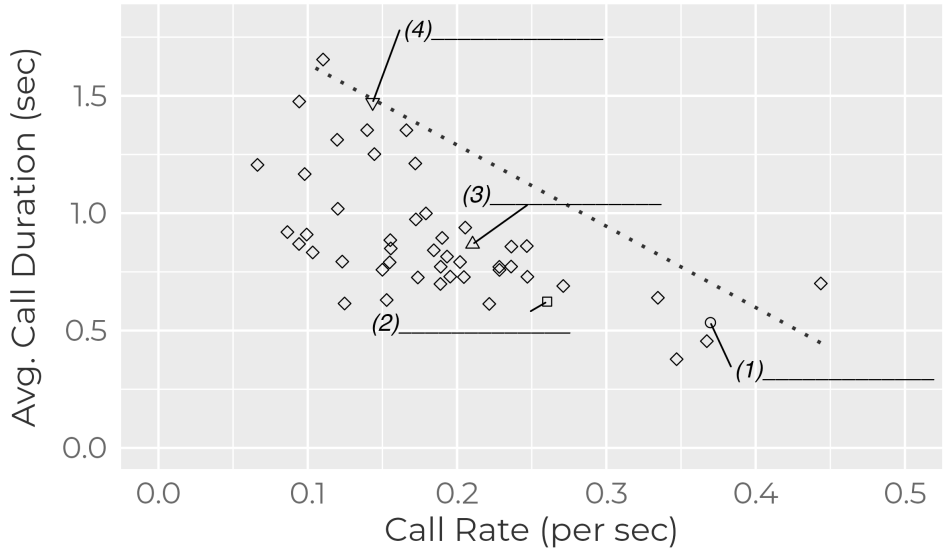
Table 1. Call measurements collected from Figures 1-3

Figure	Frog	Call #	Start	End	Calculations		
					Duration (sec)	Average Duration (sec)	Call Rate (calls/sec)
1 	Wert	1					
	Wert	2					
	Wert	3					
	Wert	4					
2 	Kermit	1					
	Kermit	2					
	Kermit	3					
	Kermit	4					
	Kermit	5					
	Kermit	6					
	Kermit	7					
	Kermit	8					
	Kermit	9					
	Kermit	10					
	Kermit	11					
3 	Trevor	1					
	Trevor	2					
	Trevor	3					
	Trevor	4					
	Trevor	5					
	Trevor	6					

Part 3. Plotting Data to Find the Mystery Frog

✎ ***Plot Your Data***: Using the data you gathered from the spectrograms, plot each frog call on the graph by labeling its name from the data table above on the provided line. There will be one extra spot without a name. Label this line "unknown."

Figure 4.
Tradeoff between call duration and rate for Eastern gray treefrogs



From Lesson 2 of 'Balancing Act' Unit Data: Adapted from Reichert & Gerhardt (2012) AmNat 180 (4) GALACTIC POLYMATH

5. Why is there no point in the upper right hand corner of the graph?

6. How does plotting the data help in understanding the tradeoffs?

7**. CER:** Which frog do you think would be most successful in attracting a mate? Make a **claim** about which of the four frogs. State your **evidence**. Explain your **reasoning** (how your evidence supports your claim).

Claim: _____

Evidence: _____

Reasoning: _____