

NAME: TEACHER KEY DATE: _____ CLASS PERIOD: _____

In nonhuman animals, sex role reversal refers to a species that has "caring males" and "competitive females." This is the opposite of what are called *conventional sex roles*, wherein females are "caring" (providing more parental investment to offspring) and males are "competitive" (investing more time and resources into attracting and competing for mates).

Table 1 shows three criteria that are necessary for a species to be considered fully sex *role reversed*. **For Qs 1-4, write whether each criterion is supported, then explain your reasoning, giving specific evidence. (For example, "Dr. Goyes Vallejos mentioned in the video that..." or "I observed in the video that..." or "the 'Role With It' card for guardian frogs showed...")**

Table 1. Requirements for a species to be considered sex-role-reversed.

Criteria	Supported? (yes or no)	Explanation (Why this criterion is (not) supported, with specific evidence)
1. Males provide most of the parental care	Q1) Yes	Q2) We learned in the video (and/or on the 'Role with It' cards) that males guard the eggs and transport tadpoles to water, while the female only lays the eggs.
2. Females produce signals that are normally produced by males	Q3) Yes	Q4) In the video, we saw males and females calling, and Dr. Goyes Vallejos said that in frogs, normally only the males call.
3. Females signal more often than males	???	Continue on to see if this criterion is supported by the data.


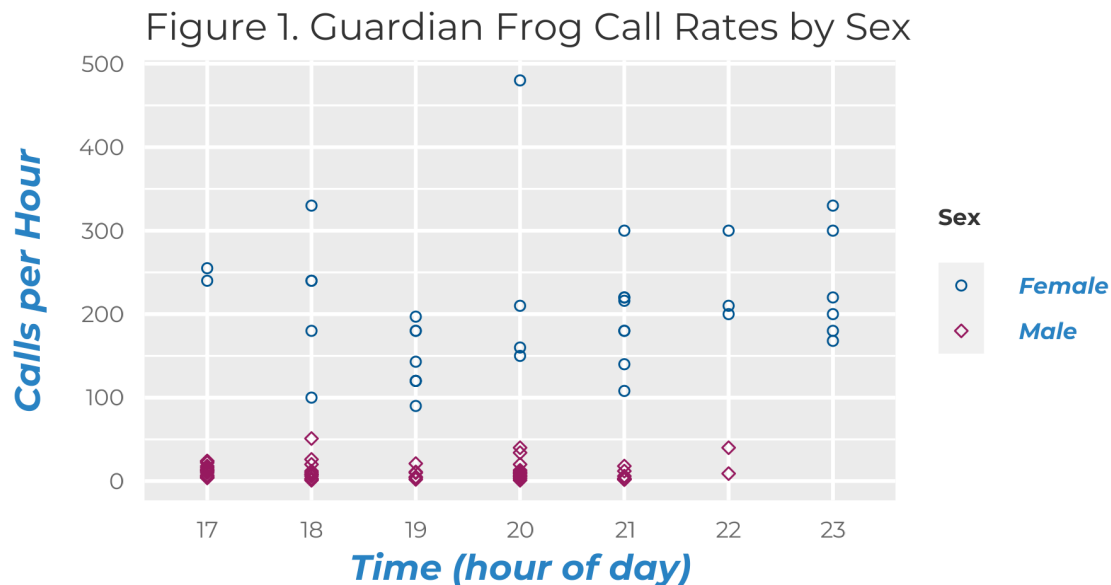
 Look over Table 2 on the next page carefully. It contains the top and bottom parts of a data table collected by Dr. Goyes Vallejos. Use this information to fill in the missing graph labels in Figure 1.

Table 2. The first 4 and last 4 data entries, showing Smooth Guardian Frog calling behavior as measured by Dr. Goyes Vallejos in Borneo.

row	sex	calls per hour	time (hour of day)
1	male	1	18
2	male	1	20
3	male	2	18
4	male	2	19
...
87	female	300	23
88	female	330	18
89	female	330	23
90	female	480	20

Qs 4-6: Fill out the 4) X-axis label, 5) Y-axis label, and 6) missing legend key labels by comparing Figure 1 below to the source data shown in Table 2.

❖ *Correct labels in blue, italicized text*



Q6: Does Figure 1 support Criterion 3 (from Table 1) for a sex role reversed species?

❖ *Yes, Figure 1 supports Criterion 3*

Q7: Explain why you think Figure 1 does or does not support Criterion 3 for a sex role reversed species, providing evidence from the graph. (i.e., Estimate the range of male and female values from the graph).

- ❖ *Figure 1 supports Criterion 3 (that females signal more than males) because it shows that males produced between 0 and about 50 calls per hour, while females produced about 90 to almost 500 calls per hour.*



Consider these facts:

Between 2000 and 2017, about 61,000 km² (23,300 mi²) of Bornean old-growth rainforest (where smooth guardian frogs live) were cut down. Currently smooth guardian frogs, which are *only found on the island of Borneo*, are listed as "declining".

Q8: Write a persuasive paragraph explaining why more research on smooth guardian frogs is important.

Your paragraph should include:

- 1. The results of your analysis of Dr. Johana Goyes Vallejos' data determining whether or not guardian frogs are a sex-role-reversed species**
- 2. Why people should care if this species went extinct**
- 3. Optional: include more facts about this frog to support your thesis**
 - ❖ *Reminder: There are lots of great articles and podcasts where students can learn fun facts linked in the "Background" section of the lesson!*

To Whom It May Concern,

I urge you to put a high priority on supporting smooth guardian frog research because they are an incredibly interesting and important species. Based on analysis of data collected by Dr. Goyes Vallejos, we have determined this to be the first known frog species with reversed sex roles. That is, males provide most of the parental care, while females call more and compete for mates. If this species were to go extinct, it would be a tragic loss for biology. We learn a lot from studying species that are the exception to the rule. If this frog species were allowed to go extinct before we fully understand why they have evolved sex role reversal, it will be a loss for science and reflect poorly on our species. Thanks for your consideration.

Sincerely,

Student