

The Bio/Diversity Project

Lesson Title: Introduction to R

Teacher: Lily and Grace
 Grade Level: 9th
 Lesson Length: 50 min

Based on Existing Lesson Plans: [Students as Scientists](#)

AZ Science Standard:	- U1: Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.
Learning Objective:	- Students will be able to form a hypothesis that tests the time of day Rufous Hummingbirds most frequently visit CHS. - Students will be able to collect data by sorting through wildlife camera pictures in the computer lab.
Scientist of the Week:	• Dr. Meaghan Emery-Wetherell • Vertebrate paleontologist who specializes in data analysis • Assistant Professor at the University of Arizona School of Information • Teaches English as a Second Language, Outdoor School, Geology, Biology, Statistics, Science Communication, and Environmental Science • Resides in Washington state • Meaghan's personal website 

Vocabulary	Materials
• Wildlife camera • Phenomena • Hypothesis	• Access to computer or laptop connected to the internet • Zooniverse.org project page • Students' notebooks and writing utensils • Slideshow



Seasonality: Spring because Rufous Hummingbirds migrate through Arizona at this time of year. Hence, students can sort through freshly taken wildlife camera photos shot in their school's courtyard.

<i>Monsoons</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec.- Feb.	Spring Mar.-Apr.	<i>Dry Summer</i> May-June
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Guiding Questions:

- *Why is it important to question the world around us?*
- *What skills or practices do scientists use to understand the natural world?*
- *What methods and tools do scientists use to collect data?*

Engagement/Introductory Activity: Tucson Trail Cam Video

- After introducing wildlife cameras' functionality, purpose, and importance, students will vote on three one-minute "critter cam videos" they want to watch.
- <https://exploretucsonmountains.com/tucson-trail-cam/>
- This engagement activity aims to showcase wildlife footage of native Tucson species.
- Duration: 5 minutes

Exploratory Activity: Write a hypothesis

- Via [presentation](#), students will learn what a hypothesis is and how to write one.
- We will define a hypothesis as a testable statement rather than a prediction, which is a common misconception.
- Students will format their hypotheses using the "I expect to observe A because B" format and then change the sentence to a statement by removing the "I expect" phrase.
- Interns will exemplify the process of writing a hypothesis using the steps above.
- Students will have five minutes to write their own hypothesis to the research question, "What time of day do Rufous Hummingbirds most frequently visit CHS?"
- Duration: 10 minutes

Explain: Think, pair, share your hypothesis

- "Share your hypothesis with your neighbor"
- "Does anyone want to share it with the class?"
- Students have the chance to communicate their hypotheses with others, which is an important part of science communication.

Extension Activity/Questions: Sort through wildlife camera data in the computer lab

- Students will head to the computer lab to sort through the footage our wildlife cameras picked up over Spring Break.
- When students access the zooniverse project, instructions will pop up that will show them how to sort photos.
- Students will sort the pictures, dividing them into two categories: "Yes, there is a hummingbird present." and "No, there is not a hummingbird present."
- Students will not need an account to access zooniverse, but they will need a device (preferably a computer or laptop) that has access to the internet in order to navigate to the project website.



Evaluation Activity: Journal reflection

- After sorting through the footage, students will write a short reflection in their journals about their experience sorting the wildlife camera footage and follow-up on their hypothesis.
- They will answer the questions: “How was your experience of collecting wildlife camera data?” and “After seeing some images of hummingbirds and noticing what time of day they were taken, do they still think their hypothesis is correct? Why or why not?”