Name_____

DATA Nugget

Blinking out?

Featured scientists: Christie Bahlai and Julia Perrone from the Kellogg Biological Station Long Term Ecological Research Program and Kent State University

Research Background:

The longest-running study of fireflies known to science was started by accident!

At the Kellogg Biological Station Long Term Ecological Research Site, or KBS LTER, scientists work together to answer questions that can only be studied with **long-term data**. They collect data in the same way over many consecutive years to look for patterns through time. One of these long-term studies began in 1989 to monitor lady beetle populations and track their movement. To count lady beetles, scientists placed yellow sticky card traps out in the same plots year after year.

Because sticky traps catch everything small that flies by, many other insect species were captured along with the lady beetles. One summer in 2004, a research technician noticed this and decided to add a few new columns of data to the spreadsheet. They began recording counts of the other insect species found on the sticky traps. Each year the record grew as more and more data were collected.

A technician recording data from sticky traps in the field. If you look at the lower, right hand side of the photo you can see a firefly that was caught! Photo Credit: K. Stepnitz, Michigan State University.

One of those new columns happened to record fireflies. Perhaps they were added because they are easy to identify. Perhaps, because they are ecologically important species - firefly larvae spend most of their time in the soil and are key predators of insects and other small animals, such as snails. Though the exact reason for this data collection is lost to history, scientists soon realized the value of this dataset.

Name_____

Many people feel that they don't see as many fireflies or other insects as they used to. This is where the importance of long-term data really comes into play. Long-term data are critical to identifying and understanding natural population cycles and trends over long periods of time that we wouldn't be able to see with just a few years of data. These data give scientists opportunities to answer unanticipated research questions that could otherwise not be tested.

Christie and Julia, two researchers at the KBS LTER, wanted to know if fireflies were in fact in decline. Like many others, they have fond childhood memories of watching fireflies blink across open fields and collecting them in jars. That fondness never went away, and today they both enjoy watching the fireflies blink across the fields where they work and live. When Christie joined the KBS LTER, Julia let her know that she was currently adding to a long-term dataset of lady beetles, fireflies, and other insects. They realized that they now had over 20 years of data on firefly numbers and that no one had yet used these data to ask whether fireflies were in fact declining.

In order to start answering this question, Christie went through all of the species recorded and pulled out the count of adult fireflies. She also noticed that the number of sticky traps varied each year. Julia knew that was due to how long each trap stayed out in the field, where they were placed, and weather events. To account for these year-to-year differences, Christie decided to use the average number of adult fireflies caught on each trap to answer her question.

All the insects collected on a yellow sticky card trap over the course of one week.
Photo credit: Elizabeth D'Auria, Michigan State University.

Name_____

Scientific Question: How are firefly populations in the KBS LTER changing over time?

Scientific Data:

Use the data below to answer the scientific question:

Year	Species ID	Number of adult fireflies	Number of traps	Average # of adult fireflies / trap
2004	LAMPY	155	262	
2005	LAMPY	265	259	
2006	LAMPY	131	296	
2007	LAMPY	62	350	
2008	LAMPY	21	330	
2009	LAMPY	77	360	
2010	LAMPY	245	390	
2011	LAMPY	292	240	
2012	LAMPY	97	450	
2013	LAMPY	83	480	
2014	LAMPY	66	387	
2015	LAMPY	337	360	
2016	LAMPY	165	509	
2017	LAMPY	426	450	
2018	LAMPY	162	449	
2019	LAMPY	190	450	
2020	LAMPY	66	390	
2021	LAMPY	142	359	
2022	LAMPY	170	385	
2023	LAMPY	50	418	
2024	LAMPY	114	385	

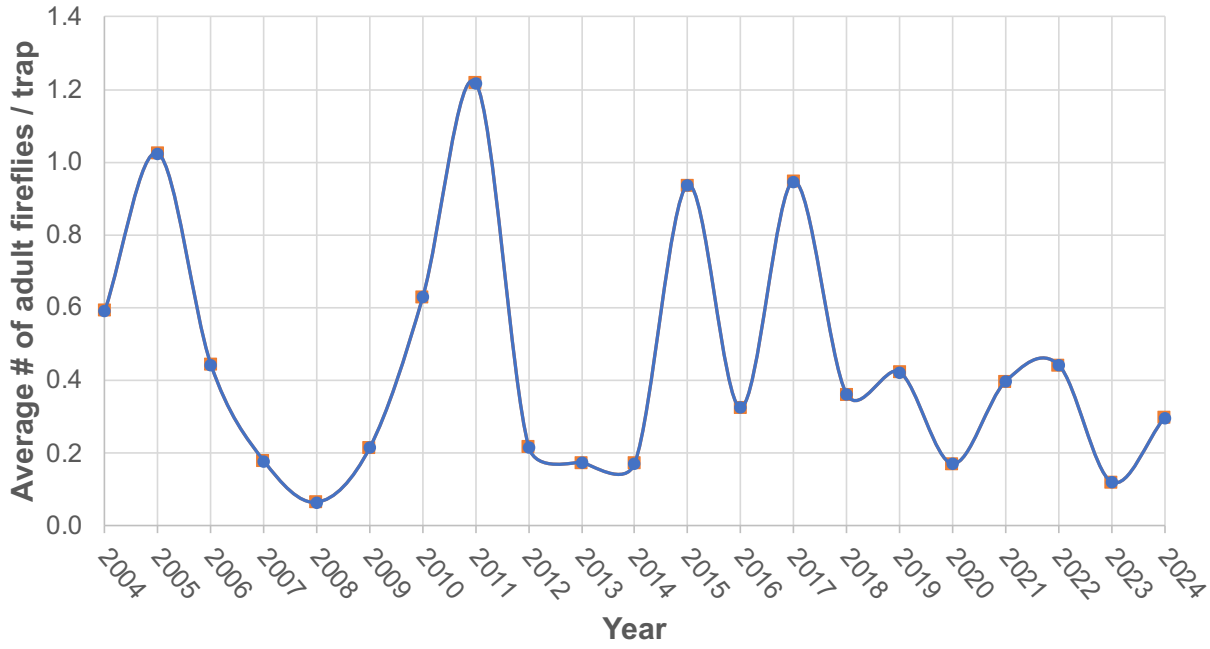
What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

Name_____

Below is a graph of the data: Identify any changes, trends, or differences you see in your graph. Draw arrows pointing out what you see, and write one sentence describing what you see next to each arrow.



Interpret the data:

Make a claim that answers the scientific question, How are firefly populations in the KBS LTER changing over time?

What evidence was used to write your claim? Reference specific parts of the table or graph.

Name_____

Explain your reasoning and why the evidence supports your claim. Connect the data back to what you learned about the value of long-term data collection.

Your next steps as a scientist:

Science is an ongoing process. What new question(s) should be investigated to build on Christie and Julia's research? How do your questions build on the research that has already been done?

What future data should be collected to answer your question?

Independent variable(s): _____

Dependent variable(s): _____

For each variable, explain why you included it and how it could be measured.

Name_____

What hypothesis are you testing in your experiment? A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.

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