

Why Are the Quail Disappearing? A Claim-Evidence-Reasoning Case

Learning target: I can use population data to decide which kind of interaction explains a decline, support the claim with specific evidence, and use the pattern of that interaction to predict what will happen next and what a manager should do.

Claim, evidence, reasoning

About 45 min

Individual

MS-LS2-2 · assesses

writing

data analysis

Name _____

Date _____

Period _____

Directions

Read the scenario and study the preserve's six-year dataset. The warm-up questions walk you through the evidence; do them first. Then write your Claim, Evidence and Reasoning in the boxes. A strong response names specific numbers from the table, says what each piece of evidence rules in or rules out, and uses the interaction patterns you have learned to explain why the evidence points where it does.

You will need: This worksheet, Pencil, Scrap paper for the fingerprint table, Calculator (optional)

The scenario

Pine Hollow Preserve is a 2,000-hectare area of oak woodland and grassy slopes in the California foothills. It was set aside partly to protect a population of mountain quail, a ground-nesting bird that eats seeds and berries. Six years ago the preserve's biologist, Dr. Okafor, started a yearly survey. In the first year, a few red foxes were seen on the preserve for the first time; red foxes are not native to this part of California and probably came from animals released or escaped decades ago elsewhere in the state. Quail numbers have fallen every year since. The preserve's board wants to know why, and what to do. Three explanations are on the table: **(1)** the foxes are eating the quail (predation); **(2)** ground squirrels, which also eat seeds, are taking the quail's food (competition); **(3)** feather lice, which live on the quail and feed on their skin and feathers, are weakening the birds (parasitism). The dataset below is a teaching dataset invented for this case; the numbers are realistic but were not measured on a real preserve.

Pine Hollow Preserve yearly survey (teaching dataset)

Simulated teaching dataset: the numbers are invented to be realistic, not measured.

Year	Quail counted	Red foxes (adults on cameras)	Ground squirrels counted	Fall seed supply (kg per hectare)	Quail carrying feather lice (%)
1	420	2	600	31	12
2	400	3	610	29	14
3	390	8	590	33	11
4	300	14	620	30	13
5	210	18	600	32	12
6	150	20	610	31	14

Simulated data for teaching. Quail and squirrels are counted on fixed survey routes; foxes are counted from camera traps; seed supply is measured in fall; lice are checked on captured quail.

Two more field notes — Note A: In years 5 and 6, the biologist examined 40 fox droppings; quail feathers were found in 24 of them. Note B: Quail nests on the ground were monitored with cameras in year 6; of 30 nests, 19 were raided, and foxes were recorded at 17 of the raided nests.

Warm-up: organize the evidence

1. Which columns changed a lot over the six years, and which stayed about the same? Give the first-year and sixth-year values for each column you name.
2. Calculate the percent change in quail from year 1 to year 6, and the number of foxes in year 6 compared with year 1 as a ratio (year 6 ÷ year 1). Show your work.
3. For each of the three explanations, name the column (or field note) that tests it, and say whether that evidence supports or weakens the explanation.

4. From Note A, calculate the percent of fox droppings that contained quail feathers. From Note B, calculate the percent of raided nests where a fox was recorded.

Your argument

CLAIM

Claim: State which interaction best explains the quail decline at Pine Hollow, naming both species involved and the effect on each (+, – or Ø).

EVIDENCE

Evidence: Give at least four specific pieces of evidence from the table and field notes, with numbers. For each one, say which explanation it supports or rules out.

REASONING

Reasoning: Explain why the evidence points to your claim using the patterns of interaction you have learned: what predation does to prey numbers over time, why a competitor or a parasite would have left different fingerprints in the data, and why the same pattern would be expected in another ecosystem where a new predator arrived.

After the argument

5. The board can afford one action: trap and remove foxes, put out extra seed, or treat quail for lice. Recommend one, predict what the quail and fox numbers will do over the next three years if your claim is right, and describe one possible side effect on another species in the preserve.

6. Describe one result from next year's survey that would make you doubt your claim, and explain why.

Fingerprint table before writing

On scrap paper, make three rows labeled predation, competition and parasitism. For each row, write what you would **expect** to see in the data if that explanation were true: for predation, a predator rising while prey falls and prey remains in the predator's diet; for competition, the competitor rising or the shared resource shrinking; for parasitism, the share of infected quail rising. Then write what the table actually shows next to each expectation. The row where expectation and data match is your claim; the rows where they do not match are evidence against the other explanations.

The predator-prey loop, interrupted

If foxes depend mostly on quail, the predator-prey pattern says the fox population should crash after the quail crash. But red foxes also eat mice, insects, fruit and garbage. Write a paragraph explaining why a predator with many food sources can keep its numbers high even as one prey species disappears, what that means for the quail if nobody intervenes, and why conservation scientists worry more about this situation than about a specialist predator.