LESSON MAKER PRO

Biodiversity by Numbers

Use fictional Alabama survey data to investigate ecosystem change.

HIGH SCHOOL · BIO.9

BIO.9 "Obtain, evaluate, and communicate data to explain how the biodiversity of Alabama contributes to ecosystem services in the state. a. Obtain and evaluate data to describe human impact on various Alabama ecosystems."

NAME _____ DATE _____

COMPARE THE CHANGE

To find percent change, divide the difference between the two counts by the starting count, then multiply by 100%. Surveys are easier to compare when they cover the same area with the same effort. A change in species counts does not, by itself, prove what caused it or show how much an ecosystem service changed.

WORKED EXAMPLE

The same Alabama forest plots were surveyed before and after a trail was widened. What was the percent decrease in native plant species recorded?

NATIVE PLANT SPECIES RECORDED

Before	After
72	63

1. Find the decrease: 72 - 63 = 9 species.
2. Divide by the starting count: 9/72 = 1/8.
3. Convert to a percent: 1/8 of 100% = 12.5%.

Answer: The recorded species count decreased by 12.5%.

PRACTICE 6 problems

1 The same creek section was surveyed before and after nearby bank work. What was the percent decrease in mussel species recorded?

MUSSEL SPECIES RECORDED

Before	After
40	30

ANSWER _____

2 A coastal dune was surveyed before and after native plants were restored. What was the percent increase in plant species recorded?

DUNE PLANT SPECIES RECORDED

Before	After
50	55

ANSWER _____

3 The same longleaf pine forest plots were surveyed before and after nearby land was cleared. What was the percent decrease in native plant species recorded?

FOREST PLANT SPECIES RECORDED

Before	After
80	64

ANSWER _____

4 The same wetland pools were surveyed before and after a drainage change. What was the percent decrease in fish species recorded?

WETLAND FISH SPECIES RECORDED

Before	After
25	15

ANSWER _____

5 Find the percent decrease for each site. Which site had the larger proportional decrease in species recorded?

SPECIES RECORDED IN EQUAL-EFFORT SURVEYS

Site	Before	After
Marsh	30	24
Forest	100	85

ANSWER _____

6 A student says road construction caused the entire change shown. Find the percent decrease in bird species recorded, then explain why the survey alone cannot prove the student's claim.

BIRD SPECIES RECORDED NEAR A NEW ROAD

Before construction	After construction
48	36

ANSWER _____

APPLY IT Show your work

1 Your class is checking a creek used for a community cleanup. Equal-effort surveys found 24 mussel species before nearby construction and 18 afterward. What was the percent decrease? Explain why the counts alone cannot tell the class how much the creek's water-filtering service changed.

WORK SPACE

ANSWER _____

2 A student group monitors an Alabama oyster reef that helps provide habitat for fish. Equal-effort surveys found 30 fish species before reef restoration and 42 afterward. What was the percent increase? Does this result alone prove that restoration caused the increase?

WORK SPACE

ANSWER _____

CHALLENGE One step up

Two Alabama sites were surveyed with the same effort before and after nearby projects. Which site had the larger proportional decrease in species recorded? Calculate both percentages and explain whether these data prove that either project caused the decrease.

SPECIES RECORDED NEAR TWO PROJECTS

Site	Before	After
Marsh	90	81
Forest	40	26

WORK SPACE AND ANSWER

Biodiversity by Numbers

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	The same creek section was surveyed before and after nearby bank work. What was the percent decrease in mussel species recorded?	**25% decrease**
2	A coastal dune was surveyed before and after native plants were restored. What was the percent increase in plant species recorded?	**10% increase**
3	The same longleaf pine forest plots were surveyed before and after nearby land was cleared. What was the percent decrease in native plant species recorded?	**20% decrease**
4	The same wetland pools were surveyed before and after a drainage change. What was the percent decrease in fish species recorded?	**40% decrease**
5	Find the percent decrease for each site. Which site had the larger proportional decrease in species recorded?	**Marsh: 20% decrease. Forest: 15% decrease. The marsh had the larger proportional decrease.**
6	A student says road construction caused the entire change shown. Find the percent decrease in bird species recorded, then explain why the survey alone cannot prove the student's claim.	**The recorded count decreased by 25%. The survey does not rule out other causes, so it cannot prove that road construction caused the decrease.**

PART 2 · APPLY IT

1. **The recorded count decreased by 25%. Species counts do not measure how much water the mussels filtered.** Compute (24 - 18)/24 = 6/24 = 25%. A count of species is not a measurement of filtration.
2. **The recorded count increased by 40%. No, other factors could also have affected the fish species count.** Compute (42 - 30)/30 = 12/30 = 40%. The before-and-after counts show a change but do not establish its cause.

CHALLENGE

The marsh decreased by (90 - 81)/90 = 10%. The forest decreased by (40 - 26)/40 = 35%, so the forest had the larger proportional decrease. Neither decrease proves that the nearby project caused it.

Accept equivalent calculations and explanations that distinguish a change in recorded species from proof of its cause. Species counts alone do not quantify an ecosystem service.