LESSON MAKER PRO

Species After Storms

Use species counts to investigate ecosystem resilience.

HIGH SCHOOL · ES.3.a

ES.3.a "Support a claim that biodiversity is a natural resource which fosters ecosystem resilience, including the role of keystone, invasive, native, endemic, and indicator species."

NAME _____ DATE _____

COMPARE SPECIES RETAINED

Species richness is the number of different species, not the number of individual organisms. To find the percent of species retained after a disturbance, divide the number still found by the number found before, then multiply by 100. A higher retained percent is evidence of resilience, but it does not show what caused the difference.

WORKED EXAMPLE

A forest survey found 25 native bird species before a windstorm and 20 afterward. What percent of the original species were still found?

1. Divide the number found afterward by the number found before: 20 / 25.
2. Simplify: 20 / 25 = 4/5.
3. Convert to a percent: 4/5 x 100% = 80%.

Answer: 80% of the original native bird species were still found.

PRACTICE 6 problems

1 A meadow had 30 native plant species before a flood and 18 afterward. What percent remained?

ANSWER _____

2 A wetland had 40 native bird species before a drought and 26 afterward. What percent of the original species were no longer found?

ANSWER _____

3 On an island, 24 endemic plant species, species found naturally only there, were recorded before a drought. Researchers found 18 afterward. What percent remained? Why could the loss of an endemic species across the whole island matter worldwide?

ANSWER _____

4 Scientists track pollution-sensitive aquatic insects as indicator species. A creek survey found 48 of these species before road runoff and 36 afterward. What percent remained, and what might the decline suggest?

ANSWER _____

5 Sea otters are a keystone species: by eating sea urchins, they help protect kelp from grazing. A coastal survey found 42 native species before a storm and 28 afterward. What fraction remained, and how might otters help this habitat recover?

ANSWER _____

6 After an invasive grass spread in a park, researchers found 27 of the 54 native plant species recorded earlier. What percent remained? Does this count alone prove that the grass caused the decline?

ANSWER _____

APPLY IT Show your work

1 Your school's creek-monitoring club surveys native aquatic insect species at two kayak launches after a severe storm. An invasive mussel is present at one launch. Calculate the percent retained at each launch and the difference in percentage points. Which launch shows more evidence of resilience? Can these data alone show that the mussel caused the difference?

NATIVE AQUATIC INSECT SPECIES

Launch	Invasive mussel	Before storm	After storm
A	Present	60	45
B	Absent	40	36

ANSWER _____

2 A snorkeling club compares two kelp-forest sites after a marine heat wave. Sea otters, a keystone species, live at one site but not the other. Calculate the percent of native species retained at each site. How do the results support a claim about biodiversity and resilience, and what can the results not prove?

NATIVE SPECIES IN KELP-FOREST SURVEYS

Site	Sea otters	Before heat wave	After heat wave
Reef A	Present	32	24
Reef B	Absent	28	14

ANSWER _____

CHALLENGE One step up

A conservation club surveys native plants in two separate nature areas after a dry season. Calculate the percent of the combined species lists retained, counting each area's list separately. Explain why averaging the two areas' retention percentages gives a different result.

NATIVE PLANT SPECIES BY NATURE AREA

Area	Before dry season	After dry season
Hill	40	30
Marsh	24	12

WORK SPACE AND ANSWER

Species After Storms

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A meadow had 30 native plant species before a flood and 18 afterward. What percent remained?	**60%**
2	A wetland had 40 native bird species before a drought and 26 afterward. What percent of the original species were no longer found?	**35%**
3	On an island, 24 endemic plant species, species found naturally only there, were recorded before a drought. Researchers found 18 afterward. What percent remained? Why could the loss of an endemic species across the whole island matter worldwide?	**75% remained. If the species lives nowhere else, its loss across the whole island would mean global extinction.**
4	Scientists track pollution-sensitive aquatic insects as indicator species. A creek survey found 48 of these species before road runoff and 36 afterward. What percent remained, and what might the decline suggest?	**75% remained. The decline might suggest that water conditions worsened.**
5	Sea otters are a keystone species: by eating sea urchins, they help protect kelp from grazing. A coastal survey found 42 native species before a storm and 28 afterward. What fraction remained, and how might otters help this habitat recover?	**2/3 remained. Otters can limit sea urchins, helping kelp survive and provide habitat for other species.**
6	After an invasive grass spread in a park, researchers found 27 of the 54 native plant species recorded earlier. What percent remained? Does this count alone prove that the grass caused the decline?	**50% remained. No, other changes could also have affected the species count.**

PART 2 · APPLY IT

1. **A retained 75%; B retained 90%. B retained 15 percentage points more and shows more evidence of resilience. The data alone do not show that the mussel caused the difference.** Calculate 45 / 60 = 75% and 36 / 40 = 90%, then subtract 75 from 90. Other differences between the launches could affect the results.
2. **Reef A retained 75%; Reef B retained 50%. The reef with otters retained a larger share of its native species, consistent with a keystone species helping sustain habitat and biodiversity. These surveys do not prove that otters caused the difference.** Calculate 24 / 32 = 75% and 14 / 28 = 50%. Compare the percentages, while allowing for other possible differences between the reefs.

CHALLENGE

Together, the areas retained 42 / 64 = 65 5/8% of their recorded species lists. Averaging the individual rates, 75% and 50%, gives 62.5% because it gives equal weight to areas that started with different numbers of species.

Accept equivalent fractions or decimals for exact percentages. Written responses should distinguish evidence of resilience from proof of its cause.