

Evidence Under Pressure

Trace environmental change to biological outcomes.

HS-LS4-5 "Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Circle each environmental change. Underline each measurement or observation that serves as evidence, then number each evidence set 1, 2, or 3 for a population becoming more common, populations becoming reproductively separated, or a species disappearing.

Three Environmental Case Files

- ① At Lake Aster, corn fields were treated with fertilizer each spring. Runoff entered a shallow bay, where scientists measured nitrate and algae for six years. Before the treatments, nitrate averaged 0.3 milligrams per liter and algae averaged 12,000 cells per milliliter. During the next four springs, nitrate averaged 1.8, while algae ranged from 71,000 to 96,000. Water samples from an unfertilized bay stayed near the earlier values. In midsummer, decomposing algae lowered oxygen in the fertilized bay, and fewer juvenile perch were caught there than in the comparison bay. Weather records showed similar rainfall across both bays.
- ② About 12,000 years ago, rising seawater divided a coastal ridge into two islands. A population of flightless ground beetles lived on the ridge before the division. Today, beetles on North Island have darker shells and a different courtship tapping pattern from beetles on South Island. DNA comparisons show that each island has genetic variants rarely found on the other. In laboratory trials, females usually rejected males with the other tapping pattern. The few cross-island pairs produced offspring, but those offspring produced very few eggs. No land bridge now connects the islands.
- ③ The Silver Spring snail was known only from one cold spring in a desert valley. During a seven-year drought, nearby wells lowered groundwater, and the spring stopped flowing within two months. Surveys before the water loss found 40 to 70 snails per square meter. Teams searched the dry springbed and nearby springs each season for three years; they found no living snails. They also detected no Silver Spring snail DNA in water when the spring briefly flowed again. Museum records and genetic samples identify no population outside this valley. The rapid loss of flowing water left little time for movement to another habitat.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What claim about the algae at Lake Aster is supported by the evidence? Cite two details that make fertilizer runoff a likely cause.

2 What environmental change began the separation of the beetle populations? Give two observations that support the claim that the populations may be becoming separate species.

3 Does the Silver Spring evidence prove that the snail is extinct? Evaluate the claim using the evidence in the passage.

4 Compare Lake Aster and Silver Spring. What does the passage suggest about how the speed of environmental change can affect organisms' chance to respond?

3 YOUR TURN _____ Your own words

A coastal marsh is flooded with salt water after a storm barrier fails. Over five years, salt-tolerant cordgrass spreads from 20 to 65 plots, freshwater sedge falls 80 percent, and a snail formerly found only in sedge is not found in 12 surveys. Write three sentences: state one claim supported by the data, cite two evidence details, and name one additional observation needed before making a stronger claim about the snail.

PART 1 • READ AND MARK

Circle each environmental change. Underline each measurement or observation that serves as evidence, then number each evidence set 1, 2, or 3 for a population becoming more common, populations becoming reproductively separated, or a species disappearing. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What claim about the algae at Lake Aster is supported by the evidence? Cite two details that make fertilizer runoff a likely cause.	Fertilizer runoff was likely linked to much greater algae abundance. Nitrate rose from 0.3 to 1.8 milligrams per liter as algae rose from 12,000 to 71,000 to 96,000 cells per milliliter, while the unfertilized bay stayed near earlier values.
2	What environmental change began the separation of the beetle populations? Give two observations that support the claim that the populations may be becoming separate species.	Rising seawater split the ridge into two islands. Different genetic variants, different courtship tapping, female rejection of other-island males, and very low egg production by cross-island offspring support growing reproductive isolation.
3	Does the Silver Spring evidence prove that the snail is extinct? Evaluate the claim using the evidence in the passage.	The evidence strongly supports disappearance of the known population, but it does not prove extinction. No living snails or snail DNA were found, and no outside population is known, yet a very small undetected population could remain.
4	Compare Lake Aster and Silver Spring. What does the passage suggest about how the speed of environmental change can affect organisms' chance to respond?	The spring stopped flowing within two months, leaving the snail little time to move to another habitat. At Lake Aster, measurements across four springs showed an algae response as nutrient conditions continued.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The data support the claim that saltwater flooding favored salt-tolerant cordgrass in this marsh. Cordgrass occurred in 65 plots after occurring in 20, while freshwater sedge declined by 80 percent and the sedge-dependent snail was absent from 12 surveys. Before claiming the snail is extinct, scientists should survey other possible habitats or test for its DNA there.

Accept equivalent claims when students connect an environmental condition to evidence rather than treating correlation as absolute proof. For the open task, accept any supported claim, two accurate data details, and a reasonable additional observation that would strengthen or limit the snail claim.