Marsh at a Crossroads

Use evidence to trace how environmental change affects a population.

BIO.15 "Engage in argument from evidence to explain how populations respond to changes in the environment that can lead to speciation or extinction."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two environmental changes, circle evidence about which birds survive or reproduce, and number the observations that could support speciation or extinction. Use your marks to build cause-and-effect arguments.

A Changing Marsh

1. Imagine a small bird species living in a coastal marsh. Some birds inherit bills that are slightly longer than others. The birds eat insects hidden in reeds, but a series of storms pushes salty water into part of the marsh. Many reeds die, while a tough grass spreads in the flooded area. Insects now hide deep inside its stems. Birds with longer bills can reach more insects there and tend to raise more young. Their offspring often inherit longer bills. The storms do not make individual birds grow longer bills; existing inherited differences affect which birds leave more offspring.

2. A road and a wide drainage channel later divide the marsh. On the salty side, long-billed birds become more common; on the freshwater side, shorter bills remain common. The groups rarely cross the channel, so they seldom exchange genes. Years later, researchers record different courtship songs in the two groups. When several birds from each side meet at an open crossing, they still choose mates from their own side. These observations support the possibility of speciation, but different bills alone do not prove that new species have formed. Continued isolation and loss of interbreeding could eventually produce separate species.

3. Now imagine a disease kills the tough grass and the remaining reeds, while construction drains the last freshwater patch. A survey finds fewer nests each year on both sides of the channel. Insects disappear as the plants vanish, and neither bill type can find enough food. If every population of this bird species dies, the species is extinct. If birds vanish from only the salty side, that is a local loss, not species extinction. A falling nest count signals risk, not proof of extinction; researchers would need evidence that no living members remain anywhere.

2 ANSWER WITH EVIDENCE

Use the passage

1. A student claims the storms made birds grow longer bills. What evidence from the passage challenges that claim, and what explains the change in bill length instead?

2. Why is the birds' behavior at the open crossing stronger evidence for possible speciation than the difference in bill lengths alone?

3. Someone argues that fewer nests prove the bird species is extinct. Use evidence from the passage to evaluate that argument.

4. How do the channel and the later loss of marsh plants create different possible outcomes for these birds? Support both outcomes with passage evidence.

3 YOUR TURN

Your own words

Suppose a new insect with a hard shell spreads only on the freshwater side, and some birds there already inherit stronger bills. Write a five- or six-sentence argument predicting one possible population change and whether it would prove speciation. Use at least two pieces of evidence from the passage, and explain what additional evidence would be needed to establish speciation.

Marsh at a Crossroads

PART 1 · READ AND MARK

Underline two environmental changes, circle evidence about which birds survive or reproduce, and number the observations that could support speciation or extinction. Use your marks to build cause-and-effect arguments. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	A student claims the storms made birds grow longer bills. What evidence from the passage challenges that claim, and what explains the change in bill length instead?	**Bill length varied and was inherited before the storms. Long-billed birds reached more insects and raised more young, so longer bills became more common in their offspring.**
2	Why is the birds' behavior at the open crossing stronger evidence for possible speciation than the difference in bill lengths alone?	**Birds from the two sides choose mates from their own side even when they meet. That suggests reduced interbreeding; different bill lengths alone do not show that the groups have stopped mating.**
3	Someone argues that fewer nests prove the bird species is extinct. Use evidence from the passage to evaluate that argument.	**Fewer nests on both sides show a decline and a risk of extinction, not proof. Extinction would require evidence that no living members remain anywhere.**
4	How do the channel and the later loss of marsh plants create different possible outcomes for these birds? Support both outcomes with passage evidence.	**The channel limits gene exchange, and the groups choose mates from their own side, which could lead to speciation. Losing the plants removes insects and food on both sides, which could lead to extinction if every population dies.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

The hard-shelled insect could favor birds that already inherit stronger bills on the freshwater side. In the passage, birds with longer bills reach more insects in tough grass and raise more young, showing how an inherited trait can become more common. The drainage channel also limits gene exchange between the two sides. However, a shift in bill strength would not by itself prove speciation, just as different bill lengths did not. Researchers would need evidence that the groups no longer interbreed, even when they meet.

Accept other evidence-based predictions that connect an inherited trait to survival and reproduction. For speciation, students should distinguish a change in trait frequency from evidence that the groups no longer interbreed.