Crossing the Divide

Use evidence to explain how a highway design can protect biodiversity.

EN.LS4.6 "Use evidence to construct an explanation that describes how a designed solution mitigates adverse impacts of human activity on biodiversity.*"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the highway's harmful effects, circle parts of the designed solution, and number the observations that show what the solution does. Use your marks to connect each observation to a possible benefit for biodiversity.

A Route Across the Highway

1 On a cold morning in Banff National Park, a grizzly bear may face a busy highway while moving between feeding areas. Roads can kill animals in collisions, but their effects go beyond roadkill. A highway can divide habitat into smaller patches, making it harder for animals to find mates on the other side. If groups become isolated, their gene pools can shrink over generations. This threatens biodiversity within a species, even when the species has not disappeared. Park managers needed a way to keep traffic moving while allowing wildlife to travel safely across the road.

2 Along sections of the Trans-Canada Highway, managers built vegetated overpasses and underpasses wide enough for large animals. Fences guide animals toward these crossings and keep many of them off the pavement. Cameras and track surveys have recorded bears, elk, and other mammals using the structures. Collision records also show a major drop in crashes involving large mammals along fenced sections. These findings support the idea that the combined design reduces deaths on the road. Because fences and crossings were installed together, the collision records alone cannot tell us how much of the drop each part caused.

3 Safe passage also matters after an animal reaches the other side. Researchers used genetic evidence to show that grizzly bears crossing the highway reproduced, connecting groups on opposite sides. This supports a longer-term benefit: crossings can help preserve gene flow instead of merely moving animals past cars. Still, camera images of animals crossing do not prove that every local species is thriving. Scientists would need to compare population trends and habitat conditions over time to assess broader effects on biodiversity. In Banff, the strongest explanation links a human-caused barrier, a guided route across it, and evidence of safer movement and reproduction.

2 ANSWER WITH EVIDENCE

Use the passage

1. Explain how the highway could harm biodiversity even if no animal is hit by a vehicle. Which part of the design addresses that harm?

2. Use two observations from the passage to explain how the combined design may reduce road deaths. What can the collision records not tell us?

3. How does the genetic evidence support a biodiversity benefit beyond preventing collisions?

4. A visitor says, "Camera images prove that the crossings restored biodiversity throughout the park." Evaluate this claim using the passage.

3 YOUR TURN

Your own words

A parking lot drains oily rainwater into a marsh; after storms, fewer frog and aquatic insect species are found near the drain. Propose a designed solution other than a wildlife crossing, and explain how two kinds of before-and-after evidence could show whether it reduces harm to biodiversity.

Crossing the Divide

PART 1 · READ AND MARK

Underline the highway's harmful effects, circle parts of the designed solution, and number the observations that show what the solution does. Use your marks to connect each observation to a possible benefit for biodiversity. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Explain how the highway could harm biodiversity even if no animal is hit by a vehicle. Which part of the design addresses that harm?	**The highway can separate groups and limit mating, shrinking their gene pools over generations. Overpasses and underpasses give animals a route between the groups.**
2	Use two observations from the passage to explain how the combined design may reduce road deaths. What can the collision records not tell us?	**Cameras and tracks show animals using the crossings, and records show fewer large-mammal crashes along fenced sections. The records cannot separate the effect of the fences from the effect of the crossings.**
3	How does the genetic evidence support a biodiversity benefit beyond preventing collisions?	**Genetic evidence shows that bears using the crossings reproduced, connecting groups on opposite sides. That connection can preserve gene flow within the species.**
4	A visitor says, "Camera images prove that the crossings restored biodiversity throughout the park." Evaluate this claim using the passage.	**The images show that some animals use the crossings, but they do not show that every local species is thriving. Population trends and habitat conditions would provide evidence about broader effects.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would build a rain garden between the parking lot and marsh to capture and filter runoff. Before and after construction, I would measure oil in marsh water after similar storms. I would also count frog and aquatic insect species near the drain. Lower oil levels and more species afterward would support the solution, although other changes could affect the counts.

Accept other plausible designs that reduce polluted runoff. The response should connect the design to the harm and identify both a pollution measure and a biodiversity measure for comparison.