Streams Under Pressure

Use field data and species roles to explain ecosystem change.

ES.3 "Construct an explanation of how biotic and abiotic factors affect biodiversity and populations in ecosystems. a. Support a claim that biodiversity is a natural resource which fosters ecosystem resilience, including the role of keystone..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two ways organisms affect other organisms, circle one abiotic factor, and number two cautions about interpreting the survey. Use your marks to help explain causes and effects.

What Can Alabama Streams Tell Us?

1. In a model field survey, students sampled three stream sites in each Alabama region during the same summer week. They counted distinct native aquatic taxa, including pollution-sensitive insect taxa, and measured water temperature. The table gives each region's pooled taxa counts and average temperature. This small survey cannot represent every stream in a region.

MODEL SURVEY: ALABAMA STREAM SITES BY REGION

Region	Native aquatic taxa	Sensitive insect taxa	Average water temperature (°C)
Coastal Plain	18	4	25
Ridge and Valley	25	9	19
Appalachian Plateau	21	7	21

2. A native species lives in an area without being brought there by people. Alabama's watercress darter is endemic: it occurs naturally only in a few springs near Birmingham. Pollution-sensitive aquatic insects can serve as indicator species because their decline may signal worsening stream conditions. Their counts are clues, not proof of one particular cause.

3. Native beavers act as keystone species when their dams create habitat for many organisms. Invasive kudzu can crowd out native plants and alter habitat. A diverse community may better withstand disturbance because species respond differently. The table's warmer streams have fewer sensitive insect taxa, but temperature alone cannot establish the cause; land use and pollution may matter too.

2 ANSWER WITH EVIDENCE

Use the passage

1. Which region had the most native aquatic taxa? Explain why that might matter after a disturbance, and give one limit of this prediction.

2. Compare the sensitive insect counts in the warmest and coolest regions. What might the difference indicate, and why can you not name temperature as its cause?

3. Why could protecting one spring near Birmingham matter for Alabama's biodiversity?

4. How could beaver dams and invasive kudzu affect a stream community in different ways?

3 YOUR TURN

Your own words

A development is proposed beside a spring that supports watercress darters. In four to five sentences, recommend one action to protect the spring, explain how it could affect biodiversity and resilience, and name one field measurement to test your prediction. Include two species roles and explain why the regional table cannot settle this local decision.

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PART 1 · READ AND MARK

Underline two ways organisms affect other organisms, circle one abiotic factor, and number two cautions about interpreting the survey. Use your marks to help explain causes and effects. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which region had the most native aquatic taxa? Explain why that might matter after a disturbance, and give one limit of this prediction.	**Ridge and Valley had 25 native aquatic taxa, the most surveyed. Greater diversity may help a community withstand disturbance because species respond differently, but three sites cannot represent every stream in the region.**
2	Compare the sensitive insect counts in the warmest and coolest regions. What might the difference indicate, and why can you not name temperature as its cause?	**The Coastal Plain averaged 25°C and had 4 sensitive insect taxa; Ridge and Valley averaged 19°C and had 9. The counts might indicate different stream conditions, but land use or pollution could also contribute.**
3	Why could protecting one spring near Birmingham matter for Alabama's biodiversity?	**The watercress darter is endemic to a few springs near Birmingham, so damage to one of those springs could threaten part of its limited natural habitat.**
4	How could beaver dams and invasive kudzu affect a stream community in different ways?	**Beaver dams can create wetland habitat for many organisms, while kudzu can crowd out native plants and alter habitat.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Protect a vegetated buffer around the spring to reduce polluted runoff from the development. Cleaner water could help pollution-sensitive indicator insects persist and protect the endemic watercress darter, which has few other natural habitats. Keeping these species and their food relationships intact may give the spring community more ways to respond to disturbance. I would count sensitive insect taxa at the spring before and after construction, because the regional table pools stream sites and cannot tell us what is happening in this particular spring.

Accept other plausible protections and field measurements if the response explains a cause-and-effect chain and uses two species roles accurately. Students should recognize that regional stream data do not establish conditions at one spring.