Reef Change Detectives

Evaluate how evidence supports ecosystem stability and change claims.

HS-LS2-6 "Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each claim, circle each piece of evidence, and number the sentences that explain how evidence supports or limits a claim. Use your marks to evaluate whether the reasoning is strong.

Kelp Forests Under Pressure

1. Along California's rocky coast, a kelp forest can keep similar kinds and numbers of organisms for many years, even though no population is perfectly fixed. Sea otters eat sea urchins, and urchins graze kelp. When otters are present, their predation usually limits urchin grazing, allowing kelp to provide food and shelter for fish, crabs, and snails. This is a claim about a web of interactions, not a claim that every species remains unchanged. Seasonal waves, reproduction, and deaths cause short-term shifts, but feedback among predators, grazers, and kelp can keep the overall community relatively stable.

2. Researchers tested part of this claim by comparing nearby reefs. On reefs where otters were regularly observed, scientists counted fewer large urchins and more standing kelp than on reefs with few otters. The pattern supports the idea that otters can indirectly help kelp by reducing grazing pressure. However, a comparison alone cannot prove that otters caused every difference. Water depth, wave exposure, disease, and fishing may also affect the counts. The evidence is stronger when repeated surveys and experiments show the same relationship over time.

3. A change does not automatically create a new ecosystem. Moderate hunting of otters could increase urchin numbers and reduce kelp, yet otter protection might allow the forest to recover. In contrast, a long marine heat wave can raise water temperatures beyond kelp's tolerance, while storms remove weakened kelp. If kelp fails to regrow, urchins may dominate the reef and algae adapted to warmer water may replace giant kelp. Fish that depended on dense kelp may decline or move away. This evidence would support the reasoning that altered physical conditions and species interactions can produce a different, relatively persistent community.

2 ANSWER WITH EVIDENCE

Use the passage

1. What claim does the first paragraph make about stability in a kelp forest?

2. How does the reef comparison support the claim that otters help kelp, and why does it not prove that otters caused every difference?

3. Explain the reasoning chain that connects a marine heat wave to a different reef community.

4. Why would an increase in urchins after moderate hunting of otters not, by itself, show that a new ecosystem has formed?

3 YOUR TURN

Your own words

Choose a different ecosystem condition change, such as a seasonal flood, drought, or new predator. Write exactly three sentences: state a claim about whether the ecosystem will stay relatively stable or become a different community, give one possible observation as evidence, and explain how that evidence supports your claim.

ANSWER KEY

Reef Change Detectives

HIGH SCHOOL · HS-LS2-6

PART 1 · READ AND MARK

Underline each claim, circle each piece of evidence, and number the sentences that explain how evidence supports or limits a claim. Use your marks to evaluate whether the reasoning is strong. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What claim does the first paragraph make about stability in a kelp forest?	**The forest can maintain relatively similar kinds and numbers of organisms over time, even though individual populations have short-term changes.**
2	How does the reef comparison support the claim that otters help kelp, and why does it not prove that otters caused every difference?	**Reefs with regularly observed otters had fewer large urchins and more kelp, which fits the predicted interaction. Other factors, such as water depth, waves, disease, or fishing, could also affect the counts.**
3	Explain the reasoning chain that connects a marine heat wave to a different reef community.	**Warmer water can exceed kelp's tolerance, and storms can remove weakened kelp. If kelp does not regrow, urchins and warm-water algae may dominate, while kelp-dependent fish may decline or leave.**
4	Why would an increase in urchins after moderate hunting of otters not, by itself, show that a new ecosystem has formed?	**Otter protection might allow the kelp forest to recover, so the change could be temporary rather than a persistent new community.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

A seasonal flood in a marsh may temporarily lower the number of nesting birds without creating a new ecosystem. A survey could show fewer nests immediately after the flood, followed by the return of reeds and nesting birds the next year. Because the plants and animals recover as water levels return to normal, the evidence supports short-term change rather than a persistent new community.

Accept equivalent claims, evidence, and reasoning that accurately distinguish temporary population shifts from a persistent change in organism types or ecosystem conditions. For Part 3, students must include a claim, a plausible observation, and a logical explanation linking the evidence to the claim.