

Biodiversity Mastery Check: Variety, Threats and Solutions

Learning target: I can show what I know about the levels of biodiversity, measuring it, why some ecosystems are fragile, how habitat loss and invasive species reduce it, and how to judge solutions that protect it.

Retrieval and mastery check

About 40 min

Individual

MS-LS2-5 · assesses

MS-LS2-4 · practice

independent practice

writing

Name _____

Date _____

Period _____

Directions

Answer every item on your own without notes. For multiple-choice items, circle one letter. For numeric items, show your calculation. For the drawing item, label every box and arrow. Finish with the synthesis paragraph in Part B. There are 12 items and 30 points; the points for each item are shown in brackets.

You will need: This worksheet, Pencil, Calculator

Part A: Retrieval (items 1-11)

1. [1 point] Which observation is an example of **genetic** diversity? 1 pt
 - ☐ A. A marsh has 31 species of birds.
 - ☐ B. Valley oak seedlings from different parent trees differ in how well they survive drought.
 - ☐ C. A county has beaches, oak woodland and pine forest.
 - ☐ D. A lawn has thousands of grass plants.
2. [1 point] Why does an Arctic tundra ecosystem tend to be more fragile than a tropical rainforest? 1 pt
 - ☐ A. Tundra organisms are smaller, so they die more easily.
 - ☐ B. The tundra has fewer species, so losing one can affect many others and few species can take over its role.
 - ☐ C. The tundra has no predators, so prey populations grow out of control.
 - ☐ D. Rainforest species never compete with each other, so they never decline.
3. [3 points] A leaf-litter sample contains 20 small animals: 10 ants, 6 beetles and 4 spiders. 3 pts

Calculate Simpson's index of diversity ($1 - \text{the sum of the squared proportions}$). Show each step.

4. [2 points] Explain the difference between **extirpation** and **extinction**, and give one example of each. 2 pts

5. [1 point] Which description best fits a **keystone species**? 1 pt

- ☐ A. The species with the most individuals in an ecosystem.
- ☐ B. A species whose effect on its ecosystem is much larger than its numbers suggest.
- ☐ C. The largest predator in every ecosystem.
- ☐ D. A species that is found in only one place in the world.

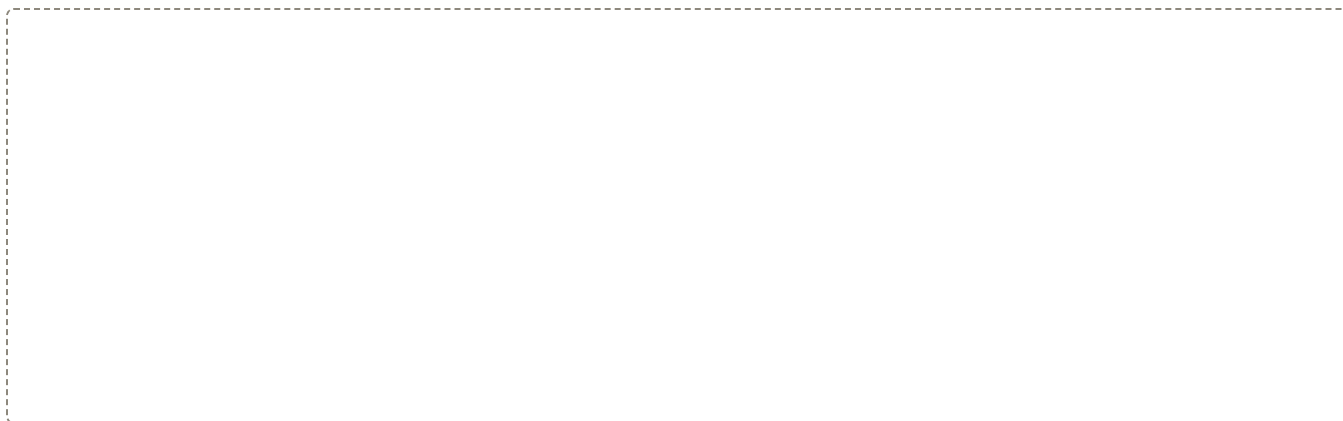
6. [2 points] True or false: 'Every species that is not native to an area is an invasive species.' Circle your answer and explain. 2 pts

☐ True ☐ False Explain your thinking:

7. [3 points] Freeways surround the mountain lions of the Santa Monica Mountains. Explain how this habitat fragmentation can reduce the lions' genetic diversity over many generations, and name one solution being built to help. 3 pts

8. [2 points] The known kākākō population was 51 birds in 1995 and 325 birds in September 2026. By what percent did it increase? Show the calculation and round to the nearest whole percent. 2 pts

9. [4 points] Draw a model with labeled boxes and arrows that shows how invasive Argentine ants can reduce a population of coast horned lizards without ever attacking them. Include native ants. Label each arrow 'more' or 'fewer' and write 'indirect effect' next to the part of your model that shows one. 4 pts



10. [2 points] A town must protect at least 90 homes from flooding and spend less than \$3 million. 2 pts
Plan X protects 100 homes, keeps 5 native bird species and costs \$2 million. Plan Y protects 95 homes, keeps 20 native bird species and costs \$2.5 million. Plan Z protects 40 homes, keeps 22 native bird species and costs \$1 million. Which plan best maintains biodiversity while meeting the constraints?
- ☐ A. Plan X, because it protects the most homes.
- ☐ B. Plan Y, because it meets both constraints and keeps far more bird species than X.
- ☐ C. Plan Z, because it keeps the most bird species and is the cheapest.
- ☐ D. None of them, because no plan is best on every measure.
11. [2 points] The lesser anteater eats mainly ants and termites, and some rainforest orchids grow only on high tree branches. Explain why species with specialized niches like these can be hit especially hard when their habitat is cleared. 2 pts

Part B: Synthesis (item 12)

12. [7 points] Choose **one** threat, habitat loss or an invasive species, and one real example from this chapter (for example, drained wetlands, freeways and mountain lions, iceplant on dunes, Argentine ants, or feral pigs and the island fox). In one paragraph: (a) explain how the threat reduces biodiversity at **two** levels (genetic, species or ecosystem); (b) describe **two** competing solutions to it; (c) judge which solution is better using one criterion and one constraint, and name the trade-off. 7 pts

If you get stuck

For the calculation, find each proportion first ($\text{count} \div 20$), square each one, add the squares, then subtract from 1; your answer must be between 0 and 1. For the percent increase, find the change first ($\text{new} - \text{old}$), then divide by the old value and multiply by 100. For the synthesis, write one sentence for each of (a), (b) and (c) before turning them into a paragraph.

Make your own mastery item

Write one new multiple-choice item about biodiversity that uses a real California example and has one correct answer and three tempting wrong answers, each based on a misconception from this chapter. Write a one-sentence explanation for why each wrong answer is tempting. Trade with a classmate and answer each other's items.