

Fixing Talia's Field Report: Counting, Calculating and Naming Biodiversity

Learning target: I can find and explain the errors in a student's biodiversity report, correct a diversity index calculation, and rewrite each mistaken statement so it is scientifically accurate.

Error analysis

About 40 min

Individual

MS-LS2-4 · practice

MS-LS2-5 · supports

writing

independent practice

Name _____

Date _____

Period _____

Directions

Talia surveyed plants at her school and at Cottonwood Flats, a creek nearby, and wrote nine statements in her field report. Some are correct and some contain a common mistake. First read her data. Then decide whether each statement is correct, and if it is not, name the idea that went wrong in a few words. Finally, explain and rewrite each incorrect statement. Be specific: a good correction says what is wrong **and** what is right.

You will need: This worksheet, Pencil, Calculator

Talia's data — School lawn: about 3,000 plants of 2 species (two kinds of lawn grass). Creek banks: about 200 plants of 23 species. Creek plot 1 (50 plants): 10 of each of 5 species. Creek plot 2 (50 plants): 42 of one species and 2 each of 4 other species.

Talia's field report

1. Biodiversity means how many living things there are. The school lawn has more biodiversity than the creek, because we counted about 3,000 plants on the lawn and only about 200 along the creek.
2. Creek plot 1 and creek plot 2 each have 5 plant species, so they have the same species richness.
3. Since their species richness is the same, plots 1 and 2 must be equally diverse.
4. I calculated Simpson's index for plot 1. Each proportion is $10 \div 50 = 0.2$, and $0.2 + 0.2 + 0.2 + 0.2 + 0.2 = 1.0$, so the index is $1 - 1.0 = 0$. Plot 1 has no diversity at all.
5. Sea otters went extinct in Washington State around 1910. Then people brought otters from Alaska in 1969 and 1970, so an extinct species came back.
6. Tomatoes are not native to California, so the tomatoes in our school garden are an invasive species and should be pulled out.
7. A freeway cannot change the mountain lions' genes. Genes are inside the lions and the freeway is outside them. The only way a freeway hurts lions is when a car hits one.
8. To bring back biodiversity at the creek, we should plant 500 trees of one fast-growing kind, because more trees always means more biodiversity.

9. Iceplant spreading over a coastal dune is an example of an invasive species lowering species diversity.

Part A: Diagnose

1. Complete the table for all nine statements. If a statement is partly right, mark it 'incorrect' and name only the part that is wrong.

Correct or incorrect?	The idea that went wrong (a few words)
Statement 1	
Statement 2	
Statement 3	
Statement 4	
Statement 5	
Statement 6	
Statement 7	
Statement 8	
Statement 9	

Part B: Explain and rewrite

2. Statement 1: What does biodiversity measure, if not the number of living things? Use Talia's data to rewrite the statement correctly.

3. Statement 3: Calculate Simpson's index of diversity for **both** creek plots (1 – the sum of the squared proportions). Show each step. Then rewrite the statement so it is accurate.

4. Statement 4: Find the step Talia skipped and redo her calculation for plot 1 correctly. Then explain why her method would give an index of 0 for **every** site.

5. Statement 5: Which term should Talia have used? Explain the difference and rewrite the statement.

6. Statement 6: Explain what a species must do to count as invasive, and rewrite the statement. Then name one piece of evidence you would need before calling a garden plant invasive.

7. Statement 7: Explain how a freeway can lower the genetic diversity of mountain lions even if no lion is ever hit. Rewrite the statement.

8. Statement 8: Explain two things wrong with Talia's plan, using what biodiversity includes. Rewrite it as a better plan in one or two sentences.

9. Statements 2 and 9 are correct. For each, explain **why** it is correct, adding one detail Talia could include to make it stronger.

Part C: The rule behind the mistakes

- 10.** Statements 1, 3 and 8 come from the same confusion. Name it, and write a two-sentence rule Talia could tape inside her notebook that would have prevented all three mistakes.

Questions to ask of each statement

For each statement ask: Is it counting **individuals** or **kinds**? Does it say how **evenly** the individuals are shared? Does the species still live **somewhere else** (extirpation) or **nowhere** (extinction)? Has the species **spread and caused harm**, or is it only non-native? For the calculation in statement 4, check: do the proportions add up to 1 before you square them? They always should.

Write a tricky statement of your own

Write two new statements Talia might have included: one that sounds wrong but is actually correct, and one that sounds right but contains a hidden error about genetic, species or ecosystem diversity. Trade with a partner, diagnose each other's statements, and explain which one fooled you and why. A good tricky statement uses a real number or a real California example.