

Exercise walk-through

3.1

Biodiversity, conservation and sampling evidence

International Baccalaureate · IB Diploma · Environmental Systems and Societies ·

3.1 Biodiversity, conservation and sampling evidence

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS evenness • species richness

Objective

Biodiversity, conservation and sampling evidence. Supported HL concept preparation; original classroom practice, not an official IB paper or assessed learner work.

1 Key knowledge and worked examples

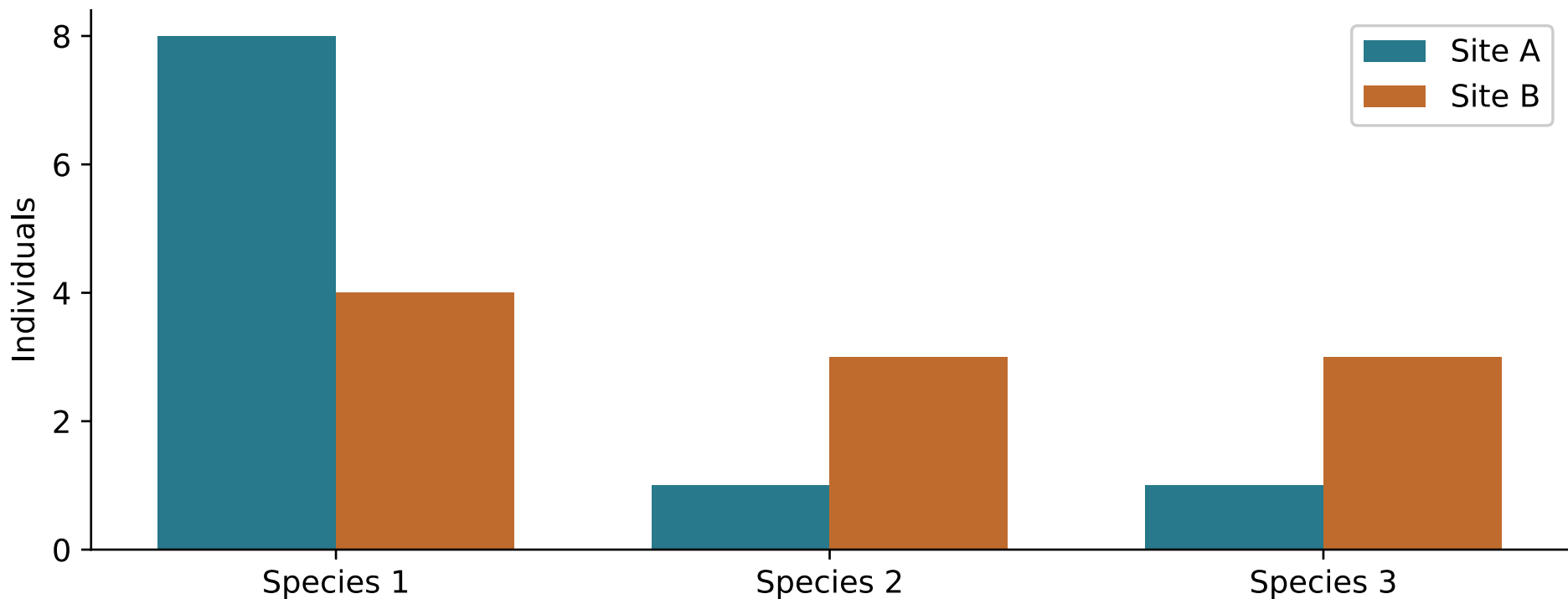
■ What would explain this observation?

- A site with many individuals can still be dominated by one species. Abundance, richness and **evenness** describe different features of biodiversity.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- **Species richness** counts species. Evenness concerns relative abundance. Conservation can protect habitats, populations or genetic diversity; a management judgement must state the conservation goal.

- species richness: The number of species recorded; evenness: How evenly individuals are distributed among species.



■ Choose evidence that can test it

- Compare surveys with similar area, effort, season and identification rules. A diversity index is meaningful only with its formula and conventions specified. Habitat fragmentation can affect movement and gene flow even when total area changes little.
- Use non-destructive field sampling approved by the school. Identify organisms with a suitable key and record uncertain identifications rather than inventing species. Combine ecological evidence with stakeholder perspectives on land use.

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions

fit this case, then rearrange before substitution.

- Known: site A has counts 8, 1 and 1; site B has 4, 3 and 3. Both have richness 3 and total abundance 10. The most abundant species occupies 80% in A and 40% in B. B is more even under these counts.

Example:

A survey records 6, 5, 3 and 2 individuals in four species. Find species richness. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- An index cannot by itself explain the cause of a difference. A newly recorded species

may reflect improved observation rather than a recent ecological arrival.

- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

A larger total number of individuals always means greater species richness. This claim is false: An index cannot by itself explain the cause of a difference. A newly recorded species may reflect improved observation rather than a recent ecological arrival.

Key:

Biodiversity, conservation and sampling evidence: Compare surveys with similar area, effort, season and identification rules. A diversity index is meaningful only with its formula and conventions specified. Habitat fragmentation can affect movement and gene

flow even when total area changes little.

Exercises 2.1-2.3

2.1 Two sites have three species each. Which can still differ? Choose one answer.

- **A** Their evenness
- **B** The definition of a species must change
- **C** They must have identical conservation value

[1]

2.2 A survey records 6, 5, 3 and 2 individuals in four species. Find species richness. Show the relation, substitution and units.

[2]

2.3 Decide whether this claim is true and justify: A larger total number of individuals always means greater species richness.

[2]

Exercises 2.1-2.3

2.1 Two sites have three species each. Which can still differ? Choose one answer.

- **A** Their evenness
- **B** The definition of a species must change
- **C** They must have identical conservation value

[1]

2.1 A Compare surveys with similar area, effort, season and identification rules. A diversity index is meaningful only with its formula and conventions specified. Habitat fragmentation can affect movement and gene flow even when total area changes little.

2.2 A survey records 6, 5, 3 and 2 individuals in four species. Find species richness. Show the relation, substitution and units.

[2]

2.2 All four species have nonzero counts, so richness=4.

2.3 Decide whether this claim is true and justify: A larger total number of individuals always means greater species richness.

[2]

2.3 False. An index cannot by itself explain the cause of a difference. A newly recorded species may reflect improved observation rather than a recent ecological arrival.

Exercises 2.4-3.1

2.4 The number of species recorded: write the technical term.

[1]

3 Exam-style questions

3.1 Site A has counts 9,1,0; B has 4,3,3. Compare richness and dominance. Explain one sampling limitation.

[4]

Exercises 2.4·3.1

2.4 The number of species recorded: write the technical term. [1]

3 Exam-style questions

2.4 species richness. species richness means The number of species recorded.

3.1 Site A has counts 9,1,0; B has 4,3,3. Compare richness and dominance. Explain one sampling limitation. [4]

3.1 A richness2, B richness3; largest shares90% and40%. B is more even in these samples. Comparable effort and detection matter; a zero observation does not prove absence.