

Exercise walk-through

15.1

Ecological niches: resources, conditions and interactions

International Baccalaureate · IB Diploma · Biology · SL

15.1 Ecological niches: resources, conditions and interactions

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

KEY WORDS ecological niche • resource partitioning

Objective

Ecological niches: resources, conditions and interactions. Supported SL concept preparation; original classroom practice, not an official IB paper or assessed learner work.

1 Key knowledge and worked examples

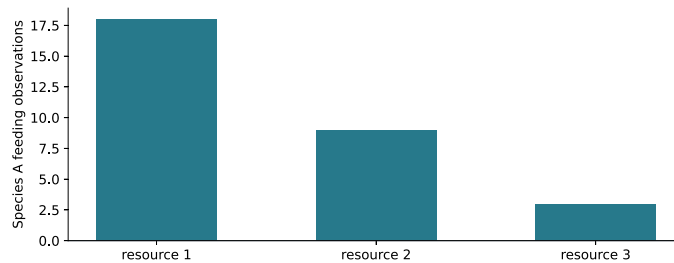
■ What would explain this observation?

- Two species can share a habitat while using different resources or using the same resource at different times. A niche describes more than a location.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- An **ecological niche** includes how an organism uses resources, responds to conditions and interacts with other organisms. A fundamental niche describes potential conditions without restrictive biotic interactions in the model; a realized niche describes the conditions occupied when those interactions operate. Competition can restrict resource use or distribution.
- ecological niche: The resource use, conditions and interactions associated with an organism's role; **resource partitioning** : Differences in resource use that

can reduce overlap among organisms.



■ **Choose evidence that can test it**

- Separate a habitat observation from a causal claim about a niche boundary. Absence from a site can reflect dispersal, detection, abiotic conditions or interactions. Resource partitioning can reduce overlap, but an observational difference alone does not prove that competition caused it. Compare alternative explanations and the timescale of evidence.
- Use permitted field observations or an attributed dataset. Record species identification confidence, resource category, time, abiotic conditions and sampling effort. Repeat observations at several locations rather than choosing only patches that fit the hypothesis. Non-destructive comparisons or approved models should be used instead of removing native species or introducing competitors.

■ **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: fictional birds A use resource categories in counts 18, 9 and 3 out of 30 observations; birds B use 3, 9 and 18. Their shared middle category is 30% for each, but the preferred categories differ. This is evidence of different observed resource use. It does not alone establish their full niches or demonstrate the cause of the difference.

Example:

A species uses one resource in 12 of 40 feeding observations. Calculate the observed percentage. Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

■ Check the conclusion and its limits

- A niche is not identical to a trophic level or a habitat. A realized niche is a context-dependent model, and an incomplete survey cannot establish every tolerance limit or competitive interaction.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

Two species living in the same habitat necessarily have identical ecological niches. This claim is false: A niche is not identical to a trophic level or a habitat. A realized niche is a context-dependent model, and an incomplete survey cannot establish every tolerance limit or competitive interaction.

Key:

Ecological niches: resources, conditions and interactions: Separate a habitat observation from a causal claim about a niche boundary. Absence from a site can reflect dispersal, detection, abiotic conditions or interactions. Resource partitioning can reduce overlap, but an observational difference alone does not prove that competition caused it. Compare alternative explanations and the timescale of evidence.

Exercises 2.1·2.2

2.1 What evidence concerns a niche rather than only a habitat location? Choose one answer.

- **A** Recorded resource use and conditions with interactions considered
- **B** A map coordinate alone
- **C** The name of the site without observations [1]

2.2 A species uses one resource in 12 of 40 feeding observations. Calculate the observed percentage. Show the relation, substitution and units. [2]

Exercises 2.1·2.2

2.1 What evidence concerns a niche rather than only a habitat location? Choose one answer.

- **A** Recorded resource use and conditions with interactions considered
- **B** A map coordinate alone
- **C** The name of the site without observations [1]

2.1 A Separate a habitat observation from a causal claim about a niche boundary. Absence from a site can reflect dispersal, detection, abiotic conditions or interactions. Resource partitioning can reduce overlap, but an observational difference alone does not prove that competition caused it. Compare alternative explanations and the timescale of evidence.

2.2 A species uses one resource in 12 of 40 feeding observations. Calculate the observed percentage. Show the relation, substitution and units. [2]

2.2 observed percentage = $12/40 \times 100 = 30\%$.

Exercises 2.3-3.1

2.3 Decide whether this claim is true and justify: Two species living in the same habitat necessarily have identical ecological niches. [2]

2.4 The resource use, conditions and interactions associated with an organism's role: write the technical term. [1]

3.1 Fictional birds use seeds/insects in counts 18/12 and 6/24. Compare resource proportions. Does overlap prove competition? [4]

Exercises 2.3-3.1

2.3 Decide whether this claim is true and justify: Two species living in the same habitat necessarily have identical ecological niches. [2]

2.3 False. A niche is not identical to a trophic level or a habitat. A realized niche is a context-dependent model, and an incomplete survey cannot establish every tolerance limit or competitive interaction.

2.4 The resource use, conditions and interactions associated with an organism's role: write the technical term. [1]

2.4 ecological niche. ecological niche means The resource use, conditions and interactions associated with an organism's role.

3.1 Fictional birds use seeds/insects in counts 18/12 and 6/24. Compare resource proportions. Does overlap prove competition? [4]

3.1 Seed use 60% and 20%; both use both resources. Overlap alone does not prove resource limitation or competition; availability, season and interactions need evidence.