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. Original classroom practice for IB SL; not an official IB paper.

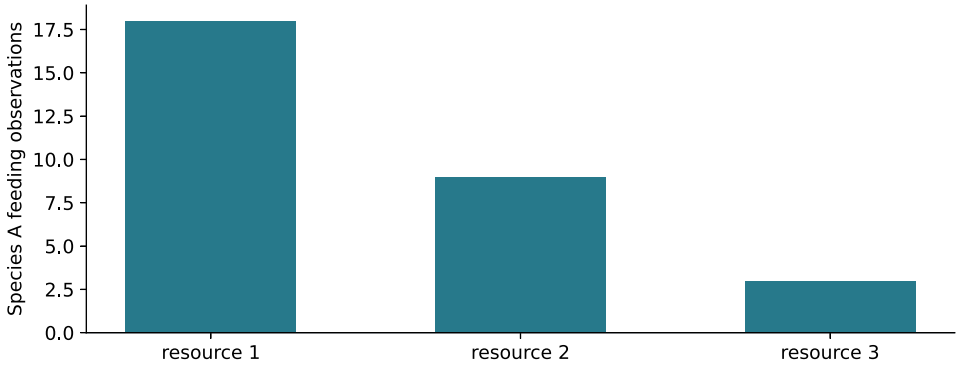
1 Key knowledge and worked examples

■ 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.

■ 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.

In the lab: 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

- 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.

Your turn: A species uses one resource in 12 of 40 feeding observations. Calculate the observed percentage.

■ 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.

Not true: Two species living in the same habitat necessarily have identical ecological niches. Species sharing a habitat can partition it - different foods, times or microsites - so identical location does not mean identical niches. Competition actually pushes coexisting

species apart in their resource use.

Key:

- An ecological niche includes how an organism uses resources, responds to conditions and interacts with other organisms.
- Separate a habitat observation from a causal claim about a niche boundary.
- Watch for: A niche is not identical to a trophic level or a habitat.

■ **Write from 20 percent of feeding observations**

- A species uses one resource in 9 of 45 feeding observations.
- Find the percentage. Sharing a habitat does not mean sharing one niche.

2 Practice

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

- **A** A map coordinate alone
- **B** Recorded resource use and conditions with interactions considered
- **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]

2.3 Decide whether this claim is true and justify: Species sharing a habitat can partition it - different foods, times or microsites - so identical location does not mean identical niches. [2]

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

3 Exam-style questions

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

Solutions

2.1 B A niche is the species' role: what it eats, the conditions it tolerates and how it interacts. Recorded resource use with conditions addresses that; a map coordinate or a site name is only a location.

2.2 observed percentage=12/40×100=30%.

2.3 True. True. Species sharing a habitat can partition it - different foods, times or microsites - so identical location does not mean identical niches. Competition actually pushes coexisting species apart in their resource use.

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

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.

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