

Ecological niches

International Baccalaureate · IB Diploma · Biology · HL

Scope and prerequisites

This handout covers selected HL topics for the course first assessed in 2025; it is not the whole syllabus.

Prerequisites: read the stated quantities and units, and use arithmetic and the model conditions below.

The examples are original and fictional: they are not real measurements or real student investigations.

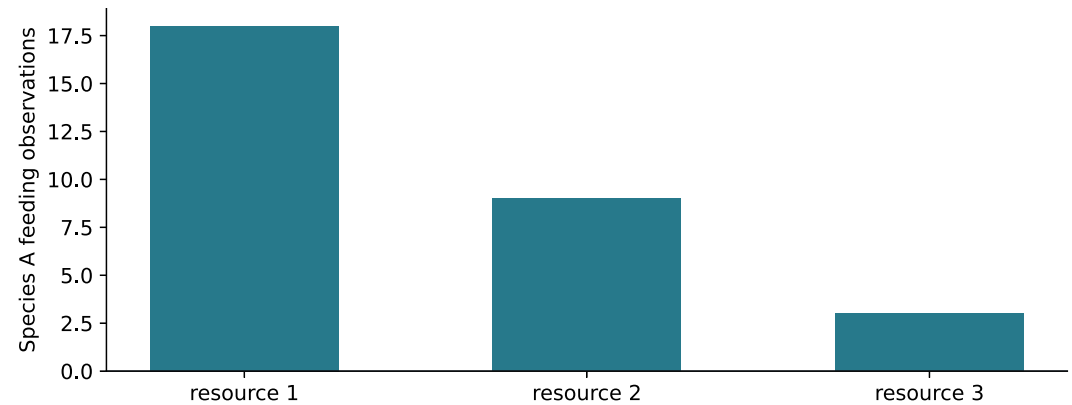
Ecological niches: resources, conditions and interactions

■ 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.



Species A feeds mostly on resource 1: 18 of 30 observations

■ 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 40 percent of feeding observations**

- A species uses one resource in 14 of 35 feeding observations.
- Find the percentage. Absence from a site is not by itself a niche boundary.

■ **Write from 10 percent for comparison**

- A second species uses the same resource in 5 of 50 feeding observations.
- Find both percentages and say which species is the narrower-niche specialist.