Estimating plant populations with quadrats

Student activity • practical and reasoning

YEAR 11 / LESSON 104 / BIOLOGY + SCIENCE (DOUBLE AWARD)

The question

How does estimated abundance of one plant differ between two defined areas?

Collect non-destructive field counts and report an estimate with sampling limitations.

Equipment

- 0.5 m square quadrat, identification card and recording sheet
- Survey map, random grid-cell coordinates and measuring tapes

Staff check the site for traffic, water, sharp litter, animal waste and unsafe ground. Stay inside agreed boundaries, wear suitable footwear and weather protection, avoid unknown plants and animals, and wash hands before eating. Keep tapes flat and visible to reduce trips.

Course coverage: Shared Biology / Double Award: 4.2. Population sampling in two areas.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Use the teacher's two marked survey areas and identify the same easily counted target plant, such as separate daisy rosettes. Record each area's dimensions.

2. Use pre-generated random coordinates from the complete sampling grid, not convenient or plant-rich spots. Place a 0.5 m × 0.5 m quadrat in the assigned grid cell.

3. Count rooted individuals using the agreed boundary rule: include top/left boundary plants and exclude bottom/right ones. Do not uproot plants.

4. Each pair samples two distinct cells in each area; pool the class's 30 quadrats per area without duplicating coordinates.

5. Calculate mean count per 0.25 m^2, convert to individuals per m^2 and multiply by the surveyed area for an estimate.

6. Compare variation and sampling limits. Conclude about the two surveyed areas only; they are not replicated examples proving a general habitat effect.

Cleanup

- Collect tapes and markers, leave organisms in place and check no litter remains.
- Wash hands before eating or drinking.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Use actual counts. Example only: a mean of 3 plants per 0.25 m^2 gives 12 plants m^{-2}; over 100 m^2 the estimate is 1200. The estimate assumes representative sampling and a consistently identifiable counting unit. It is not an exact census.

Area / sample	Grid cell	Plant count	Notes
A1			
A2			
B1			
B2			

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What is the quadrat area?

2. Why use random coordinates?

3. How do you convert mean count to density?

4. Calculate the example population estimate.

5. Why use one boundary rule?

6. What limits generalisation from two areas?