

Sampling Notes

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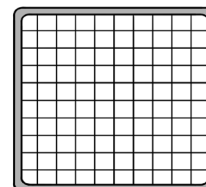
Sampling Plants

The most common method of sampling plants is to use quadrats. These are square grids, usually either 0.25m^2 , 0.5m^2 or 1m^2 , which are placed on the ground and the number and type of plants within the grid are recorded.

Plants can be sampled using **random sampling** or **systematic (non-random) sampling**.



FRAME
QUADRAT



FRAME QUADRAT
WITH 10 x 10 GRID

Random sampling: the position of the sample is completely random. Locations of sampling are chosen by chance.

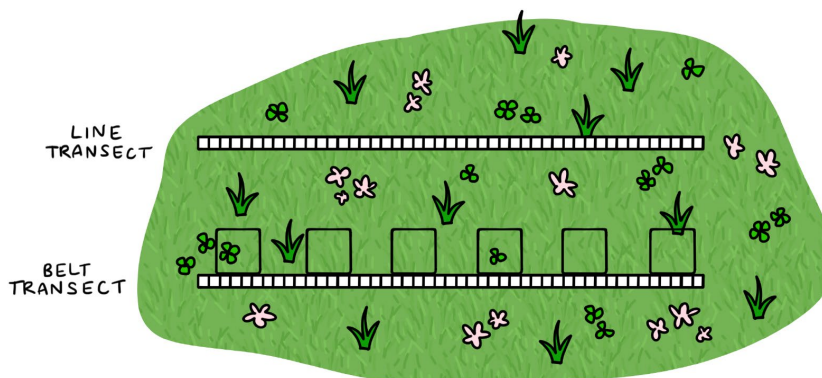
A good way of doing this is to lay out two tape measures like a giant graph, and use a random number generator to pick coordinates. So, we then place the quadrat at those exact coordinates to eliminate human bias.

Non-random sampling: the position of the sample is set. Locations of sampling are chosen by the people doing the sampling. This is usually done using either a line or belt transect.

What is the difference between a line transect and a belt transect I hear you not ask?

A line transect: a line across a habitat or part of a habitat. It is usually a piece of string or rope. The plants along the transect are recorded.

A belt transect: the same as a line transect but used with a quadrat as well. We set the line up and place a quadrat at regular intervals along it. At each interval, we record the plants present, **and** we measure the **abiotic factors** (by using a light meter) to see how the environment affects where the plants grow.



A common calculation question that appears asks you to **determine the percentage cover**.

Step 1: Count the number of **full squares** (full of the plant) of the quadrat.

Step 2: Combine any **part filled squares** to make full squares.

Step 3: Calculate the percentage cover using the following equation.

$$\text{Percentage cover} = \frac{\text{Number of covered squares}}{\text{Total squares}} \times 100$$

Let's have a look at an exam style example question for plant sampling. 😊

Example 1: A group of students are investigating the population of daisies in a rectangular playing field.

The field has a length of 20 m and a width of 15 m. The students use a quadrat with an area of 0.5 m². They throw the quadrat randomly 10 times and count the total number of daisies in all 10 quadrats. In total, they counted 40 daisies.

Calculate the estimated total population of daisies in the field.

Step 1: Calculate the total area of the field.

$$\text{Area} = \text{length} \times \text{width}$$

$$\text{Total area} = 20 \text{ m} \times 15 \text{ m} = 300 \text{ m}^2$$

Step 2: Calculate the total area sampled by the students.

$$\text{Sampled area} = \text{number of quadrats} \times \text{area of one quadrat}$$

$$\text{Sampled area} = 10 \times 0.5 \text{ m}^2 = 5 \text{ m}^2$$

Step 3: Substitute the values into the population equation and solve.

$$\text{Total population} = (\text{total area of field} \div \text{total area sampled}) \times \text{number counted}$$

$$\text{Total Population} = (300 \div 5) \times 40$$

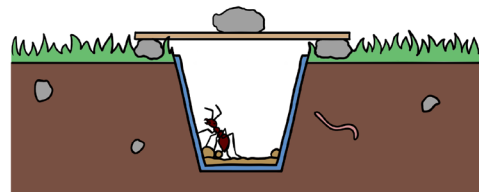
$$\text{Total Population} = 2,400 \text{ daisies}$$

Sampling Animals

How do we sample animals to find out which animals are present in a habitat and how can we get an idea of the numbers of each animal present? The following are the most common sampling techniques.

1. **Pit fall traps** – these are small holes that have been dug into the ground. This will trap crawling invertebrates if they fall in.

Note: place a roof over the trap when it is ready. Otherwise, it could fill with rainwater.



A pitfall trap

2. **A pooter** – these devices are used to suck up small insects into the chamber.

No, you will not suck them up into your mouth, there is a covering to prevent that.



A pooter

3. **Sweep nets** – this is a large net used to catch flying insects or insects in long grass.



A sweep net

How do we estimate the number of animals in a habitat?

The method that we study at GCSE is called the capture – recapture method. How does this work?

Step 1: Capture organisms from a sample area.

Step 2: Mark individual organisms then release them back into the community.

Step 3: A few days later, recapture organisms in the same sample area.

Step 4: Record the number of marked and unmarked individuals.

Step 5: Use the following equation:

Note: Please learn this method and equation off 😊

$$\text{Estimated population size} = \frac{\text{first sample size} \times \text{second sample size}}{\text{number of recaptured individuals}}$$

Take the following example.

In an area of woodland 120 woodlice were captured. These were released, a few days later 187 woodlice were captured in the same area, of these 4 were marked. Estimate the population of woodlice in the area.

$$\text{Estimated population size} = \frac{120 \times 187}{4}$$

$$\text{Estimated population size} = \frac{22440}{4}$$

$$\text{Estimated population size} = 5610 \text{ woodlice}$$

Does the capture recapture method make any assumptions? Oh yeah! Three main ones 😊 These are...

1. **The mark that we made stayed on:** so, the mark we made didn't rub off or wash off.
2. **The mark we made didn't affect survival:** the mark didn't make the animal stand out to predators or stop it from moving normally. So, we probably wouldn't use a white paint dot... That would stand out and a predator would be more likely to get that one... That would affect our result and be a bad day for the thing we caught!
3. **The population was "closed":** what we mean by that is there were no massive amounts of births, deaths, or animals migrating in or out of the area between our samples being taken.