Sampling plants

It is not allways possible to count all the plants in a habitat, so a sample is taken. A **quadrat** (a portable frame, typically with an internal grid) is often used to sample plants. It marks off an exact area so that the plants in that area can be identified and counted.

Quadrat size and number of squares (grids) depend on the habitat and target species. In forests larger quadrats and random sampling of quadrats are used. For smaller quadrats all specimens in a given quadrat are counted.

Quadrats are also used for underwater sampling or intertidal zone sampling (mainly for seagrasses and some sessile invertebrates).

Another way of plant or animal population size estimation is made by using transects. A **line transect** is a line (string or rope) across a habitat or part of a habitat which is placed on the ground. They are mainly used to determine **particular gradients or linear patterns** to see how plant/animal communities change. They provide a good way of being able to clearly visualise the changes taking place along the line.

A line transect can be up to a few meters or even 100 km long; depending on the specific requirements of the study. Generally the presence/absence of species at each marked point (at 0.5m, or 1m intervals etc.) is recorded. Or the number of organisms of each species can also be recorded. The species touching the line or around the line may be recorded.

Sampling animals

Line or belt transects work very well for plants and also can be used for several animals. However, it is impossible to find and count all the animals in an area. For certain animal groups which tend to hide or escape from humans you need specific sampling methods. For example; the population size of small invertebrates living on the ground can be estimated using pitfall traps or handnets can be used for beetles and other insects.

Mark and recapture is a very common and non-destructive method used in ecology to estimate an animal (particulary highly mobile animals) population's size. A portion of the population is **captured, marked, and released and allowed to mix with the rest of the population**. Later, another portion is captured and the number of marked-tagged individuals within the sample is counted. And you get an estimate of the population size with the following formulae.

Whatever you method you use to estimate population size, one important question is the **area** should be investigated. The number of species will increase as the area covered increases until you count all of the species inhabiting that habitat. However, limited funds and time is a challening factor. Thus, you should define the minimum area should be covered to get an idea of the habitat under interest.

Population Growth

Population ecology is the study of how populations change over time and space and interact with their environment. Populations are described by characteristics that include:

- **population size**: the total number of individuals in the population
- **population density**: average number of individuals in a particular area
- **population growth**: how the size of the populations change over time.

First, studying how and why populations grow or shrink helps scientists make better predictions about future changes in population sizes and growth rates. This is particularly essential for **conservation of biodiversity** (e.g., the polar bear population is declining, but how quickly, and when will it be so small that the population is at risk for extinction?) and **the effects of human population growth** (e.g., how fast will the human population grow, and what does that mean for climate change, resource use, and biodiversity?).