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Biodiversity Sampling and Types of Sampling Data

Slides supplied by Fars Zedan

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Lecture: 10

SAMPLING WORK

Sampling is the process of selection of a subset of individuals from a population to estimate characteristics of the entire population.

We can make inferences about a population by obtaining a sample from it.

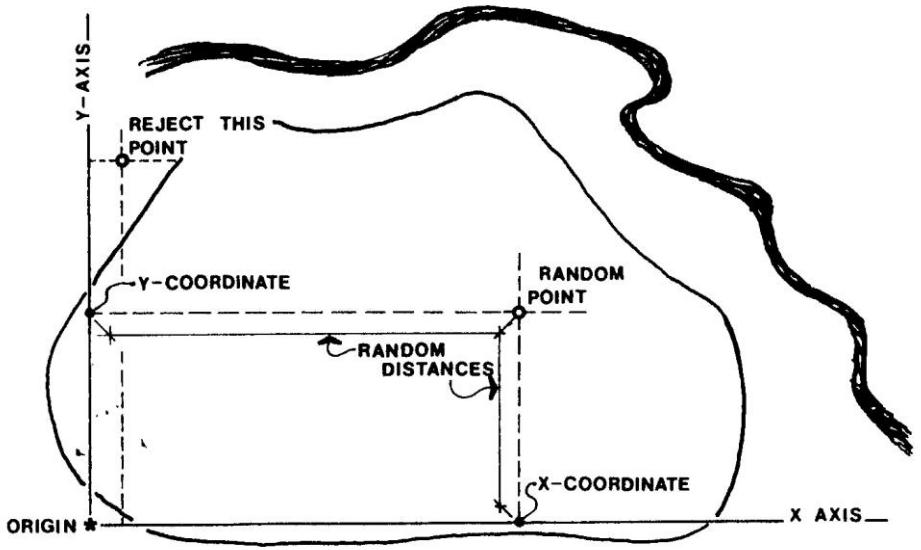
Sampling can be divided into two broad categories:-

1. RANDOM
    a. Simple random sampling
    b. Stratified random sampling
2. SYSTEMATIC

RANDOM SAMPLING

Simple random sampling

- Define co-ordinate axis.
- Generate random sampling co-ordinates.
- Measure sampling units from co-ordinates.



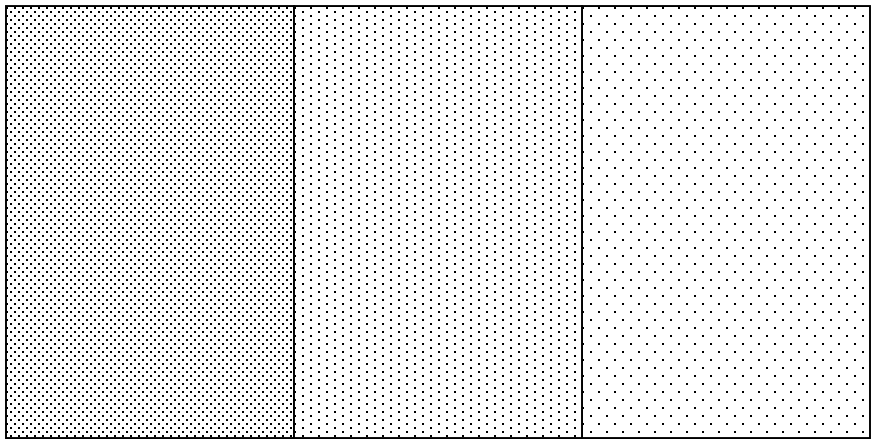
- Samples should be distributed throughout sampling area.
- Edge-effect should be minimised.
- Sampling is performed without replacement (same co-ordinates cannot be re-sampled).

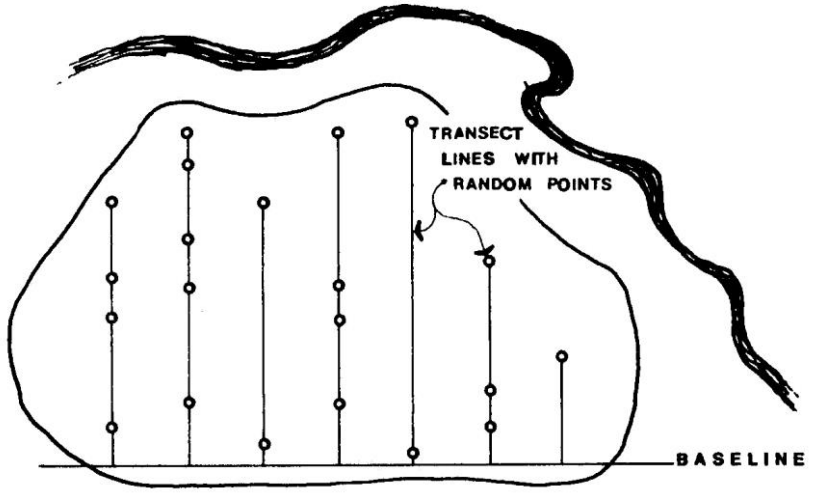
RANDOM SAMPLING

Stratified random sampling

- Powerful way to improve accuracy of sampling.
- Divide sample (N) into separate sub-populations called *strata*:

  $N = N_1 + N_2 + N_3 + \ldots\ldots + N_L$
- Then sample separately in each stratum.
- However, stratification must have rational basis.





Source: Chambers and Brown (1983: 5)

SYSTEMATIC SAMPLING

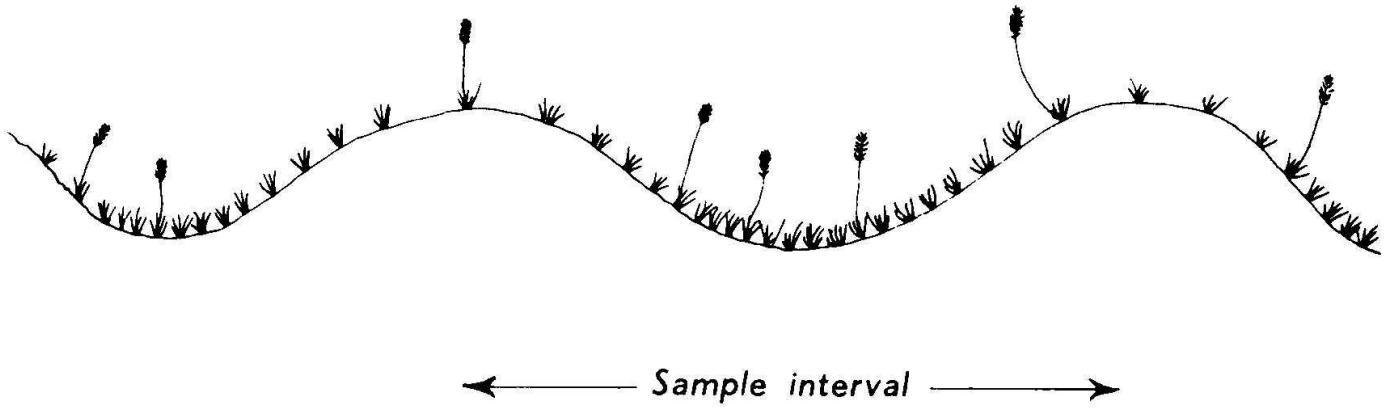
- Use axis to form grid as before
- Samples taken at regular rather than random intervals.

		3			**6**		
9			**12**			**15**	
	18			**21**			**24**
		27			**30**		
33			**36**			**39**	
	42			**45**			**48**

- Advantage of being quicker than random sampling.
- Generally used for descriptive and mapping purposes e.g. rapid assessment of sward productivity for grazing animals.
- Periodicity in vegetation may bias sample.

SYSTEMATIC SAMPLING

PERIODICITY



- If the vegetation in a particular area exhibits periodicity then systematic sampling can produce false impressions of abundance or occurrence.
- Examples include the ridge and furrow scenario above or occurrence of species in relation to pH.

TYPES OF SAMPLING DATA

DATA ARE OF TWO MAIN FORMS

1. **Qualitative data -** descriptive (physiognomy).
2. **Quantitative data -** a measure of abundance is attached to each species.
    - Many different measures of abundance in use.
    - Measurement may be either: -

1. Subjective: generally involve simple visual assessment of vegetation abundance.
2. Objective : are actual physical assessments of abundance.

ABUNDANCE DATA

OBJECTIVE METHODS

- Accurate assessment is best achieved by objective rather than visual measurement.
- There are several different methods by which abundance data can be collected (direct and indirect):

- Total counts (population)
- Quadrats
- Transects

Sample

Direct assessment

- Capture-recapture
- Indices

Indirect assessment

POPULATION ABUNDANCE

This is an important approach in the monitoring of particular species for conservation or ecological purposes.

Several options depending on resources available: -

- Total counts
- Sampled counts
- Capture-recapture
- Indices

TOTAL COUNTS

- This is simply a count of all the individuals in a given area.
- May be aerial or ground-based.
- Works well where species are large or area is relatively small.
- E.g. Elephant, rhino and buffalo (clumped distributions separated by large distances) or orchid plants in a small reserve.
- Has the advantage of being accurate.
- However, can be very costly both financially and in terms of time and human resources.

SAMPLED COUNTS

- This draws on standard sampling theory.
- The study area is divided into a series of sampling units of uniform size (e.g. 1 km^2 quadrats) and a set proportion are sampled.
- Count obtained by multiplying up from a sample.
- Accuracy of estimate increases with number of samples.
- Need some measure of error of estimation e.g. number of kangaroos = 1741± 300 (i.e. 1441 – 2041).
- Must decide if this is acceptable level of error.

INDICES

These make use of attributes that change in a predictable manner with changes in density.

There are a variety of indices that can be used in this way: -

- Nest density (song birds)
- Track density (bears or deer)
- Number of sightings per unit time (e.g. whales)
- Pellet or faecal dropping count (e.g. owls or deer)
- Active burrow entrances (e.g. ground squirrels).
- Indices are often only really useful for comparing changes in density between areas over time.