

ECOLOGICAL SAMPLING



What is a sample?

- “A portion, piece, or segment that is representative of a whole”



Why do we sample?

- Because it is usually impossible to count all the plants or animals present in a given area
 - e.g. # dragonfly larvae in a pond
 - e.g. # mesquite trees on a river terrace
 - e.g. plant cover on a river terrace
 - e.g. species of plants in the Rio Salado

NON-INVASIVE SAMPLING

- Avoid any degradation of the habitat when sampling
- Removal of whole or parts of organisms should be limited to species that can quickly recover



REPRESENTATIVE SAMPLING

- Take a number of samples from around the sampling site so as to be reasonably sure that the samples represent the site in general



Necessities...

- the samples represent the whole
 - It is necessary to take enough samples so that an accurate representation is obtained
 - It is necessary to avoid bias when sampling

SAMPLING UNITS

- Type determined by the organisms and the physical nature of the habitat being sampled
 - Area of ground surface
 - Volume of air, water or soil
- Standard units enable comparison of results



QUADRATS

- A standard, area sampling unit consisting of a square frame
- Consistent size and shape is essential for comparing samples from different places and/or times



Quadrat size

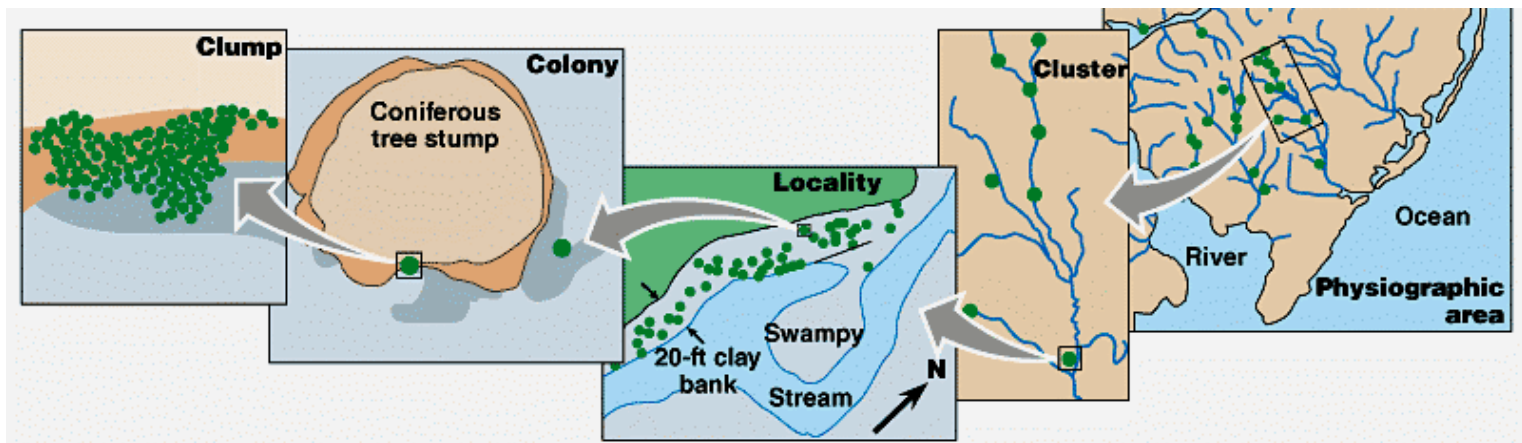
- Chosen to suit sampling goals
- A balance between what is best and what is practical is always necessary
- Should suit:
 - practical constraints
 - habitat
 - organism

Practical Constraints

- Small quadrats are quicker to survey but yield a smaller individual sample of habitat
 - Often require a larger # of samples to represent the habitat
- Large quadrats require more time and effort to survey but provide a larger individual sample of habitat
 - Often require a smaller # of samples to represent the habitat

Habitat size

- Appropriate sample unit size depends on size scale of the habitat
 - Small scale habitats require smaller sized samples
 - Ex. Boulders
 - Large scale habitats require larger sized samples
 - Ex. Forests

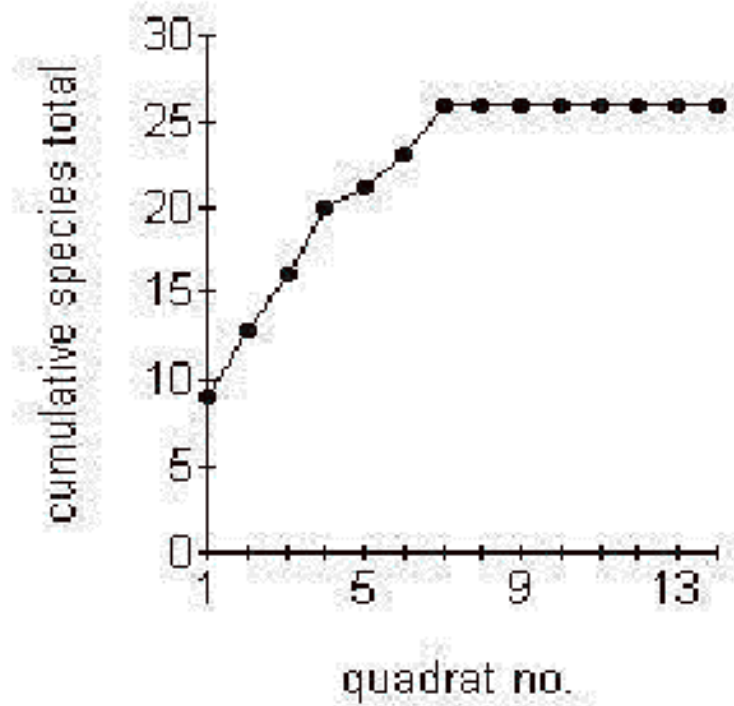


Organism size and density

- Depends on size and density of organisms
 - Small, dense organisms require smaller samples
 - Ex. grass
 - Large, scattered organisms require larger samples
 - Ex. Trees

Number of Quadrats

- More quadrats is more representative but there are time and effort limitations
- How many is enough?
 - Determine by plotting a graph of a given feature vs. number of quadrats



TYPES OF SAMPLING

- Systematic
- Stratified
- Random

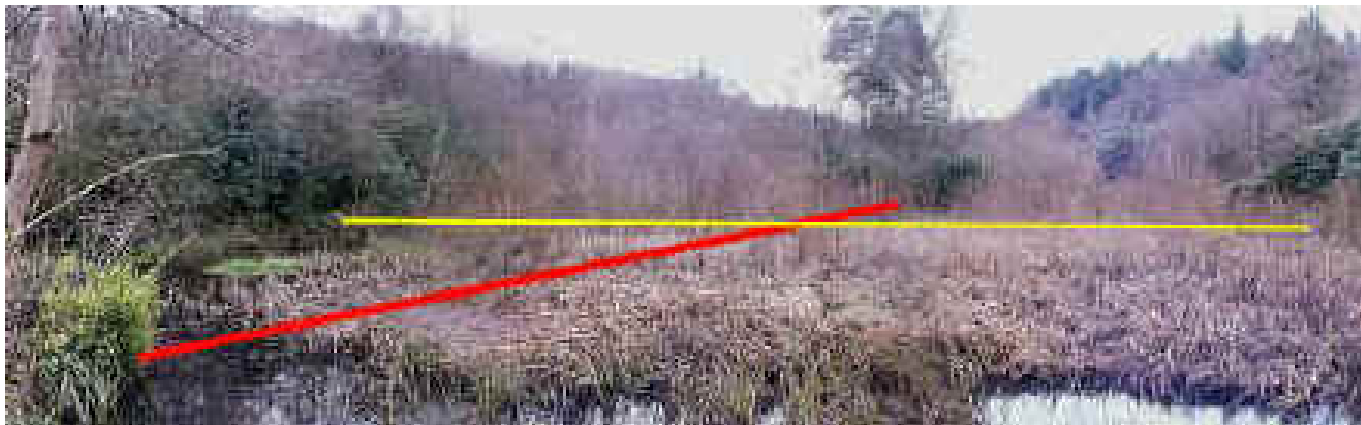
SYSTEMATIC SAMPLING

- Often used when the area being studied is varied, not very large, or when time is available
- Samples are taken at fixed intervals



How to sample systematically

- Systematic samples are usually taken along a transect line marked by a tape measure
- **Transect**- a line laid across an area



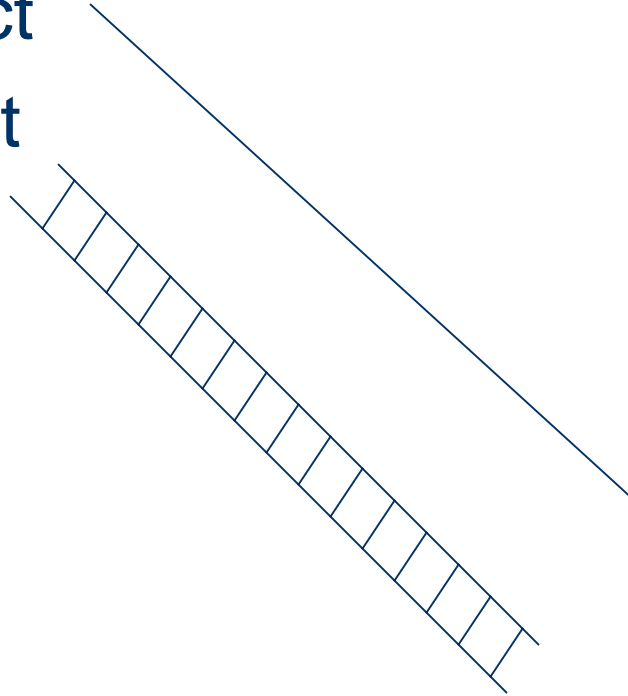
Sampling along gradients

- Transects are set up along an environmental gradient
 - down a hillside
 - across a streambed
 - out from a source of pollution



Types of transect sampling

- Line transect
- Belt transect



Line transect method

- A measured line is laid across the area in the direction of the environmental gradient
 - The species touching the line can be recorded along the whole length of the line (continuous sampling) or at specific points along the line (systematic sampling)



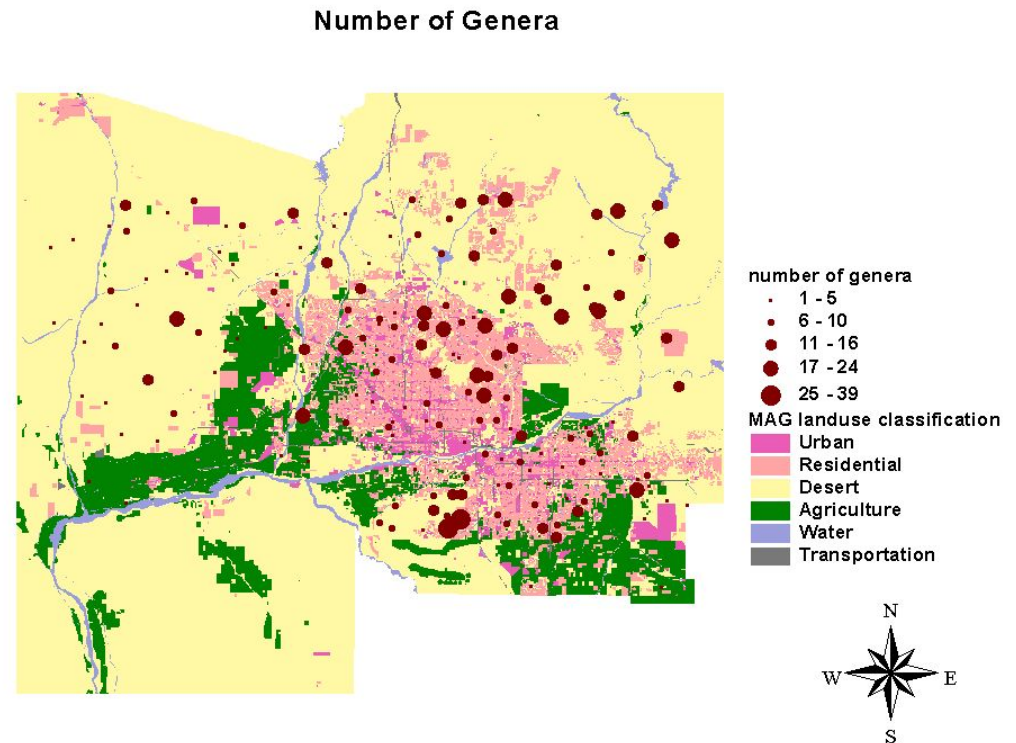
Belt transect method

- Similar to line transect but widens the sampling area
 - Transect line is laid out
 - Samples are taken by determining abundance or % cover in an area that is a defined distance from the line
 - Samples can be taken all the way along the line, at specific intervals or even randomly



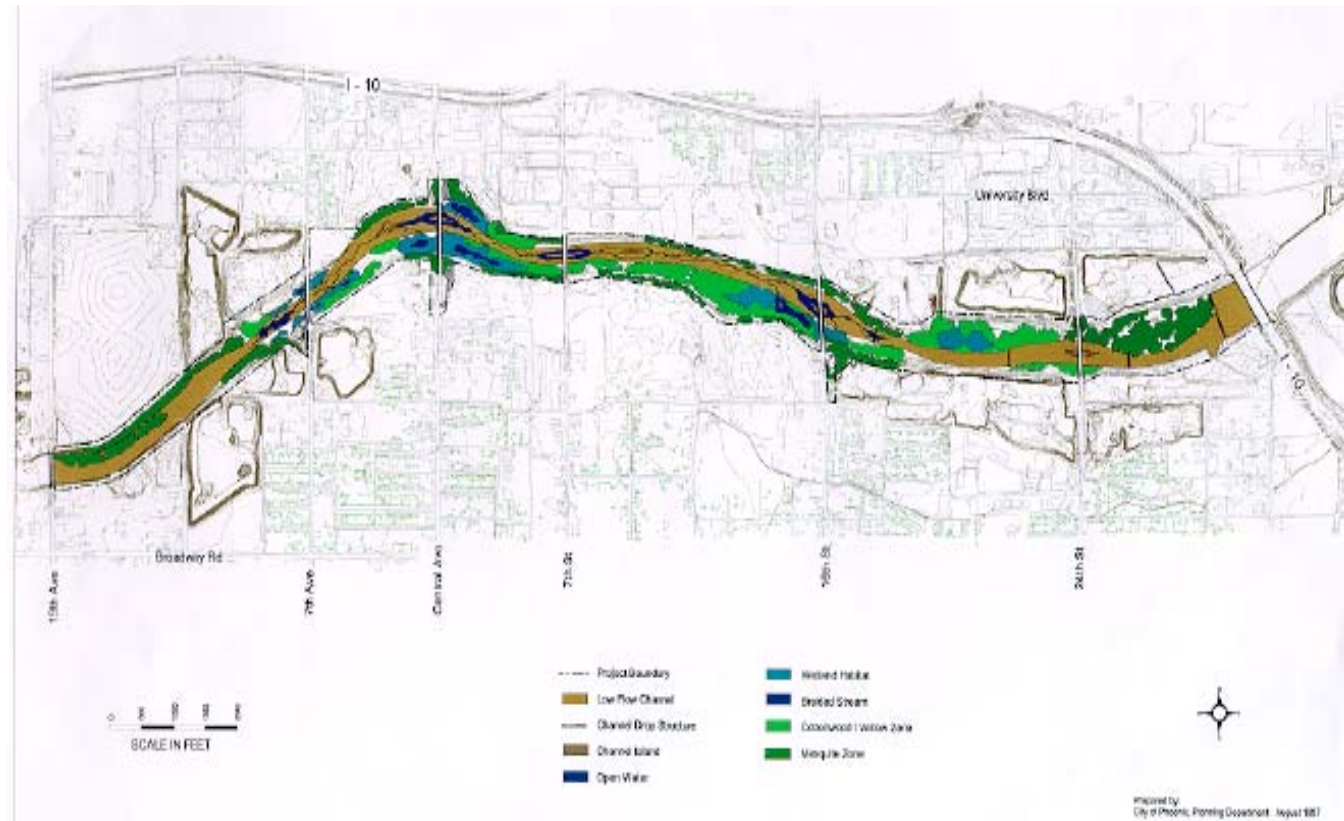
STRATIFIED SAMPLING

- Often used when there are small areas within a larger habitat that are clearly different
- **Strata**- major differences within communities recognized before sampling begins



Strata in the Rio Salado Site

- bank
- terrace
- channel
- ponds
- streams

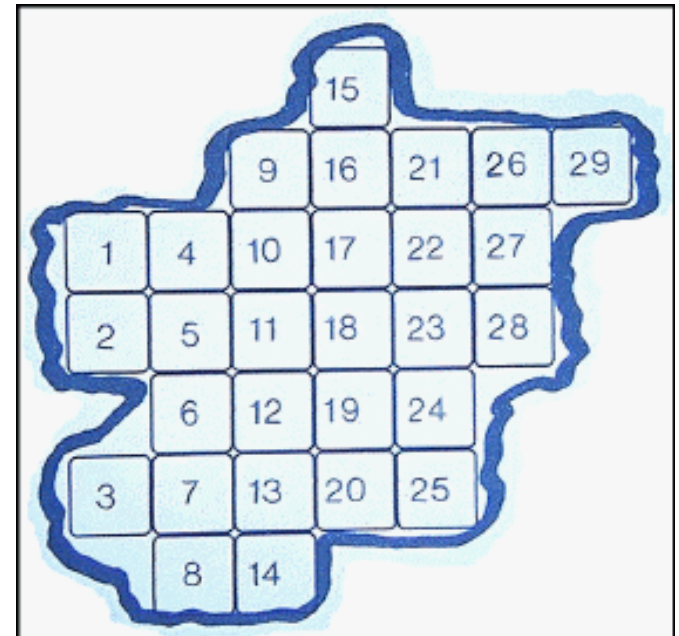


RANDOM SAMPLING

- Often used when the area being studied is fairly uniform, very large, or when there is a limited amount of time available
- **Random** = chosen by chance rather than according to a plan; all outcomes are equally likely
- Samples are taken from different positions within a habitat and those positions are chosen randomly

How to sample randomly

- Choose individuals or Place “sampling units” **haphazardly**
 - This is rarely completely random
 - OR...
- Assign numbers to the areas or individuals to be sampled
 - Use a **random number table** to select which areas or individuals will be sampled



How to sample randomly

