

# Population

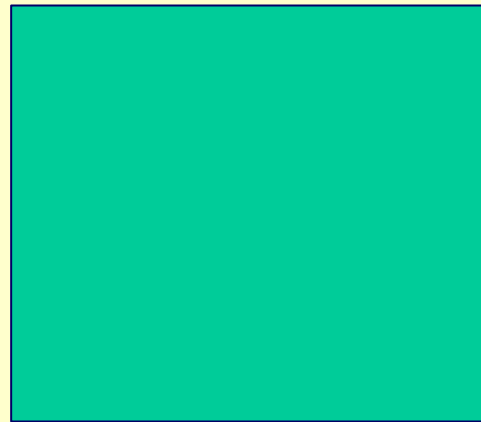
- A group of organisms of the same species in a given area with no barriers to interbreeding.

## Traits that affect sampling methods:

- organism's size
- habitat type
- population size and distribution
- organism's mobility

# Plots for plants

- shape
- size
- number
- distribution



# Distribution of plots

- Random
- Stratified random
- Systematic

## Lincoln-Peterson Index

- $N = nM/x$
- $N$  = number in population
- $n$  = number caught in census
- $M$  = number caught in precensus
- $x$  = number marked animals caught in census
- based on  $x/M = n/N$

# Assumptions

- Equal chance of catching marked and unmarked animals
- Mortality and natality = 0
- Adequate time for marked animals to mix back into the population

# Population Structure

- **Density** = number / unit area
- **Biomass** = dry mass / unit area
- **Cover** = measure of space occupied or influenced by population (e.g. **basal area** = area of stem at 4.5 ft height)
- **Frequency** = proportion of sample units in which species is found

# Dominance

- **Importance Value (IV)** = relative density + relative basal area (cover) + relative frequency
- **Biomass**



# Temporal Patterns in Populations

- Discrete behavior
- Continuous behavior:
  - circadian (diurnal) cycles
  - seasonal cycles
  - secular cycles

## Dispersion Patterns (random sampling)

- $s^2/\bar{x} = 1$  or  $s^2 = \bar{x}$  then random
- $s^2/\bar{x} > 1$  or  $s^2 > \bar{x}$  then clumped
- $s^2/\bar{x} < 1$  or  $s^2 < \bar{x}$  then uniform

# Sources of Genetic Variability or New Genetic Information in a Population

- Mutation
- Recombination

# Causes of Change in Gene Frequencies in Populations

- Mutation pressure
- Migration pressure (gene flow)
- Genetic drift
- Natural selection

# Genetic Drift

- Chance fluctuations in allele frequencies in a directional sense caused by random sampling error

# Natural Selection

- The non-random process operating on gene frequencies that eliminates certain genotypes. Under selective pressures, the most fit genotypes will survive, others will not.

# Different Patterns of Selection

- **Optimizing or stabilizing selection**
  - occurs to some degree in all populations
- **Directional or dynamic selection**
  - example, rabbits and Myxoma virus
- **Disruptive or diversifying selection**
  - example, Acmaea digitalis (a mollusk)