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

- $N = \frac{nM}{x}$
- $N =$ number in population
- $n =$ number caught in census
- $M =$ number caught in precensus
- $x =$ number marked animals caught in census
- based on $\frac{x}{M} = \frac{n}{N}$
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)