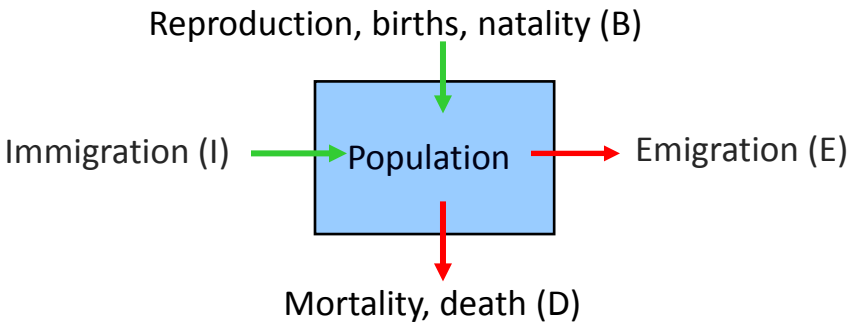
Population Abundance



$$n_{t+1} = n_t + \overbrace{(B + I)}^{\text{Gains}} - \overbrace{(D + E)}^{\text{Losses}}$$

r or lambda

Population parameter terms:

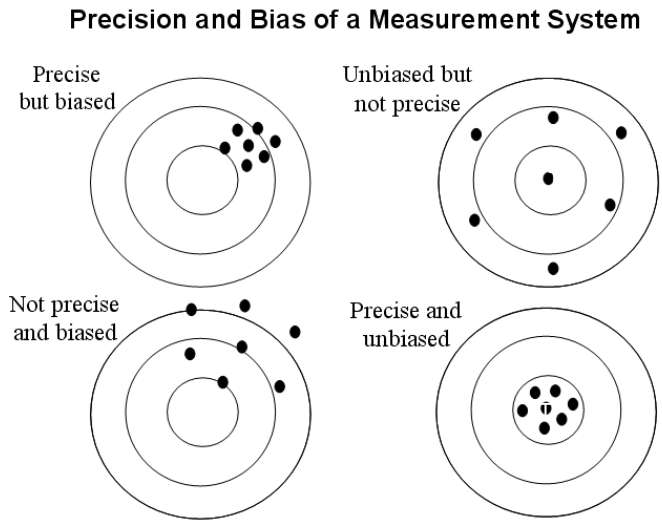
- Abundance or population size - number of individual animals
- Population density - number of individuals per unit area (e.g., 1.2 squirrels/ha)
- Relative density - ranking of populations by density
- Census - complete count of an entire population
- Population estimate - an approximation of the true population size based on some method of sampling or modeling. A robust population estimate is still close to the true population size even if some of the assumptions of the estimation procedure are violated.
- Index - constant but unknown relationship between true abundance and the value of the index. **(from Lancia et al. 2005)**

Characteristics of Population Estimates

- Expected value - The *average* population estimate if the estimation procedure was performed many times under exactly the same conditions. The expected population estimate is represented by E(*N*).
- Accuracy - Measure of how close a population estimate is to the true population size
- Bias - Difference between the expected value of a population estimate and the true population size
- Precision or Variance - Measure of how close population estimates are to the **expected** (NOT the true) value

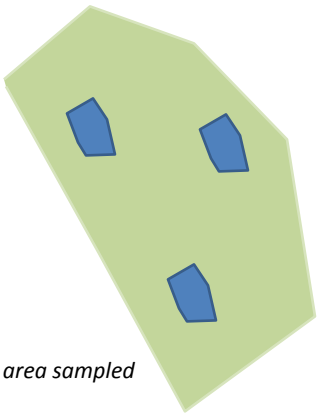
(from Lancia et al. 2005)

Precise? Biased? T = true and expected value



Methods for estimating abundance

- Total Counts (census)
  - Territory/Spot Mapping
  - Aerial Photography
  - Snorkeling
  - Stream census



- Total Counts on sample plot
  - Survey smaller area, *B = proportion of total area sampled*
  - *N = c / B*

c = count, N = abundance estimate

What can you do as a researcher to decrease the variance in you estimate when using sample plots?

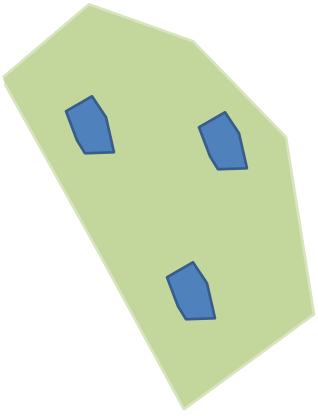
Methods for estimating abundance

Naïve counts do not account for probability of detection in different seasons, habitats, or methods

Population estimates that we will focus on next, and that you will use most often do.

There are many variations but all are summarized by:

Estimate of abundance =
Count of animals/probability of detection



- Total Counts on sample plot
  - Survey smaller area, *B = proportion of total area sampled*
  - *N = c / B* p*

c = count, N = abundance estimate, p = prob detection