# Peterson's Mark and Recapture

The Peterson method is the simplest mark and recapture method. The procedure involves capturing a number of individuals, marking, releasing, and then recapturing to check for marked individuals. All of this needs to be done over a relatively short period of time. The second sample needs to be random and allow for the unmarked individuals to have the same opportunity to be captured.

## The Biased Estimator Equation:

$$N = \frac{CM}{R}$$

The variables are:

M = The number of individuals marked in the first sample.
C = The total number of individuals captured in the second sample.
R = The number of individuals in the second sample that are marked.

This formula is widely used because it is intuitively clear. But the formula can produce a biased population estimate. If (M + C) is greater than or equal to N and at least 7 recaptures R > 7 this formula can be used. This formula considers that once an individual is counted it is not replaced back into the population. Thus eliminating the possibility of sampling the same individual twice.

## The Unbiased Estimator Equation:

$$N = \frac{(C + 1)(M + 1)}{R + 1} - 1$$

If removing sampled individuals is not feasible, a second formula can be used.

## The Unbiased Estimator Equation (replacement accounted for):

$$N = \frac{M(C + 1)}{R + 1}$$

Five assumptions to be considered for an accurate estimate when using the corrected formulas:

- The population is closed, so the size is constant.
- All animals have the same chance of being caught in the first sample.
- Marking individuals does not affect their catch-ability.
- Animals do not lose marks between the two sampling periods.
- All marks are reported on discovery in the second sample.

Other considerations:

- Accidental deaths do not affect the first assumption.
- Population size refers to the catchable population.
- Random sampling is critical.
- Poor marking techniques will destroy the most careful recapture scheme.

## Also See:

Chapter 2 - Estimating Abundance: Mark-and-Recapture pages 16-27 in:

Krebs, C. J. 1998. Ecological Methodology. Harper and Row, Publishers. New York. 654 pp.