

1. In a study of two-lined salamanders (*Eurycea bislineata*), a biologist randomly placed seven 1.0 m by 1.0 m quadrats in a field that measured 100 m by 100 m. Estimate the population density and size if the biologist found 0, 1, 1, 2, 0, 1, and 3 salamanders in the seven quadrats.
2. In a survey of northern mountain ash seedlings, researchers randomly placed eight 1.0 m by 2.0 m quadrats in a field that measured 100 m by 150 m. Estimate the population density and size if the researchers found 2, 0, 0, 8, 6, 1, 1, and 3 seedlings in the eight quadrats.
3. Biologists captured 75 red foxes in a forested area and marked them with ear tags. Exactly 10 days later, they captured 45 red foxes and found that 15 had ear tags. Estimate the red fox population in this area.

$$\text{Total population } (N) = \frac{\text{Total number marked } (M) \times \text{Size of second sample } (n)}{\text{Number of recaptures } (m)}$$

4. Imagine that you capture a sample of 180 butterflies in a park, mark them, and then release them. A week later, you capture 210 butterflies and find that 30 are marked. Determine the estimated butterfly population in the park during the study period.

$$\text{Total population } (N) = \frac{\text{Total number marked } (M) \times \text{Size of second sample } (n)}{\text{Number of recaptures } (m)}$$