Answer on Question #53434 – Biology – Ecology

Question:
Suppose we conduct a study on a rodent species over an area of 120 ha (1 ha = 10,000 m2). It is found that rodents live only in scattered areas represent a quarter of the area of the region. It captures a first sample of 200 individuals, there brand and they are released. Later, capture a second sample of 200 individuals. It is then found that 20% of the animals of the first sample were recaptured. (Answer the following questions by showing your calculations.)
a. Using these data, estimates the size of the total population.
b. What is the density of the population of rodents (in per hectare)?
c. What is the mode of distribution of rodents?

Answer:
a. The data used here is based on the mark-recapture sampling procedure allowing to estimate the population:
    $M/N = m/n$,
where M – marked rodents captured first time (200), N – total rodents population, m – recaptures rodents, n – rodents captures second time (200).
Number of recaptured rodents is: m = (200/100%) · 20% = 40.

So, the size of the total population is:
    N = (M · n)/m = 200 · 200 / 40 = **1000 rodents**

b. Population density can be expressed in two ways: crude density and ecological density.
Crude density of population is a number of animals within the entire habitat (total area).
    D = N/S,
where D – population density (crude), N – the size of the total population, S – area.

So, crude population density of rodents is:
    D = 1000/120ha = **8.3 rodents per hectare**

Ecological population density is a number of animals within the territory they live on (is used by animals).
    d = N/s,
where d – population density (ecological), N – the size of total population, s – area (¼ of total area = 120/4 = 30 ha).

So, ecological population density of rodents is:
    d = 1000/30ha = **33.3 rodents per hectare**

c. Considering that rodents live only in scattered areas of the total area the mode of their distribution/dispersion (pattern in which individuals are distributed through area) is a clumped dispersion – the population of rodents is concentrated in certain parts of the total area.

Clumped   Uniform   Random