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- Methods of determining the size of a population are direct and indirect observations, sampling, and mark and recapture studies.

3 = 100 m² - <u>direct observation</u> - to count all of a population's mem

Crabs in 1 m² = 4

- <u>indirect observation</u> - to observe signs of organisms and count these. (nests).

- <u>estimate</u> - an approximation of a number based on reasonable assumptions.

- <u>Sampling</u> - one way to estimate the size of a population is to count the number of organisms in a small area and then multiply to find the number in a larger area.

<u>mark-and-recapture</u> - Count all the organisms in an area and mark them before release. Some time later return and capture the organisms again. Count the number of organisms that have been marked an how many are not marked. Using a mathematical formula, estimate the total population.

<u>birth rate</u> - is the number of births in a population in a certain amount of time.

<u>death rate</u> - is the number of deaths in a population in a certain amount of time.

<u>Population statement</u>

birth rate > death rate, population increases
death rate > birth rate, population decreases

<u>immigration</u> - means moving into a population

emigration - means leaving a population

<u>population density</u> - the number of individuals in a specific area.

$P = \frac{18}{3m^2}$

6 sr. p/m²

Population density = $\frac{\text{Number of individuals}}{\text{Unit area}}$

<u>limiting factor</u> - an environmental factor that causes a population to decrease.

<u>limiting factors</u> - food
water
space
weather conditions

Organisms require <u>food</u> and <u>water</u> to survive. These are often limiting factors

<u>carrying capacity</u> - the largest population that an area can support. Populations usually stay near its carrying capacity because of limiting factors in its habitat.

<u>space</u> - another limiting factor for both plants and animals.

weather - weather conditions such as temperature and the amount of rainfall can also limit population growth.

D = $\frac{\text{Krds}}{\text{area}}$

D = $\frac{20 \text{ krids}}{81 m^2}$ $\frac{U}{U}$ $\frac{\cdot}{\cdot}$

D = $\frac{20 \text{ crabs}}{5 m^2}$ = $\frac{4 \text{ crabs}}{}$ p/m²

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1a. Direct observation, indirect observation, sampling, and mark and recapture

1b. Samplings; there would be too many mushrooms over too large an area to count them individually.

2a. Join - birth, immigration; leave - death, emigration

2b. 500 mice (100 m + 600m - 200m = 500 m)

2c. Some mice may have immigrated into the population.

3a. Food and water, space, weather

3b. ① A population cannot grow beyond the number that can be supported by the amount of food and water available.
② If organisms do not have enough space, some will not be able to reproduce or survive.
③ Severe weather conditions can kill members of a population.

3c. A severely cold winter could kill large numbers of pigeons and reduce the population.