

Populations and Communities ▪ *Section Summary*

Studying Populations

Guide for Reading

- How do ecologists determine the size of a population?
- What causes populations to change in size?
- What factors limit population growth?

Some methods of determining the size of a population are direct and indirect observations, sampling, and mark-and-recapture studies. Direct observation involves counting the members of a population one by one. Indirect observation involves counting tracks, nests, or other signs rather than the organisms themselves.

Many times, it is not possible to count every member of a population because the population is too large or spread out or the members are hard to find. Instead, ecologists make an estimate of the population. An **estimate** is an approximation of a number, based on reasonable assumptions. One type of estimating involves counting the number of organisms in a small area (a sample), and then multiplying to find the number in a larger area.

Ecologists sometimes use a technique called mark and recapture. Some animals are first captured, marked, and released into the environment. Then another group is captured. The ecologists count the marked animals in this group. Using a mathematical formula, the ecologists can estimate the total population of those animals in the area.

Populations can change in size when new members enter the population or when members leave the population. The major way in which new individuals are added to a population is through the birth of new offspring. The **birth rate** of a population is the number of births in a population in a certain amount of time. The major way that individuals leave a population is by dying. The **death rate** is the number of deaths in a population in a certain amount of time. If the birth rate is greater than the death rate, the population will generally increase in size. If the death rate is greater than the birth rate, the population size will generally decrease. The size of a population can also change when individuals move into or out of the population. **Immigration** means moving into a population. **Emigration** means leaving a population. Graphs are useful to show changes in the size of a population over time.

One way to state the size of a population is in terms of **population density**—the number of individuals in a specific area. Population density is calculated by dividing the number of individuals in the population by the total area. The result tells how many individuals there are per unit area.

A **limiting factor** is an environmental factor that prevents a population from increasing. **Some limiting factors for populations are food and water, space, and weather conditions.** The largest population that an environment can support is called the **carrying capacity**.