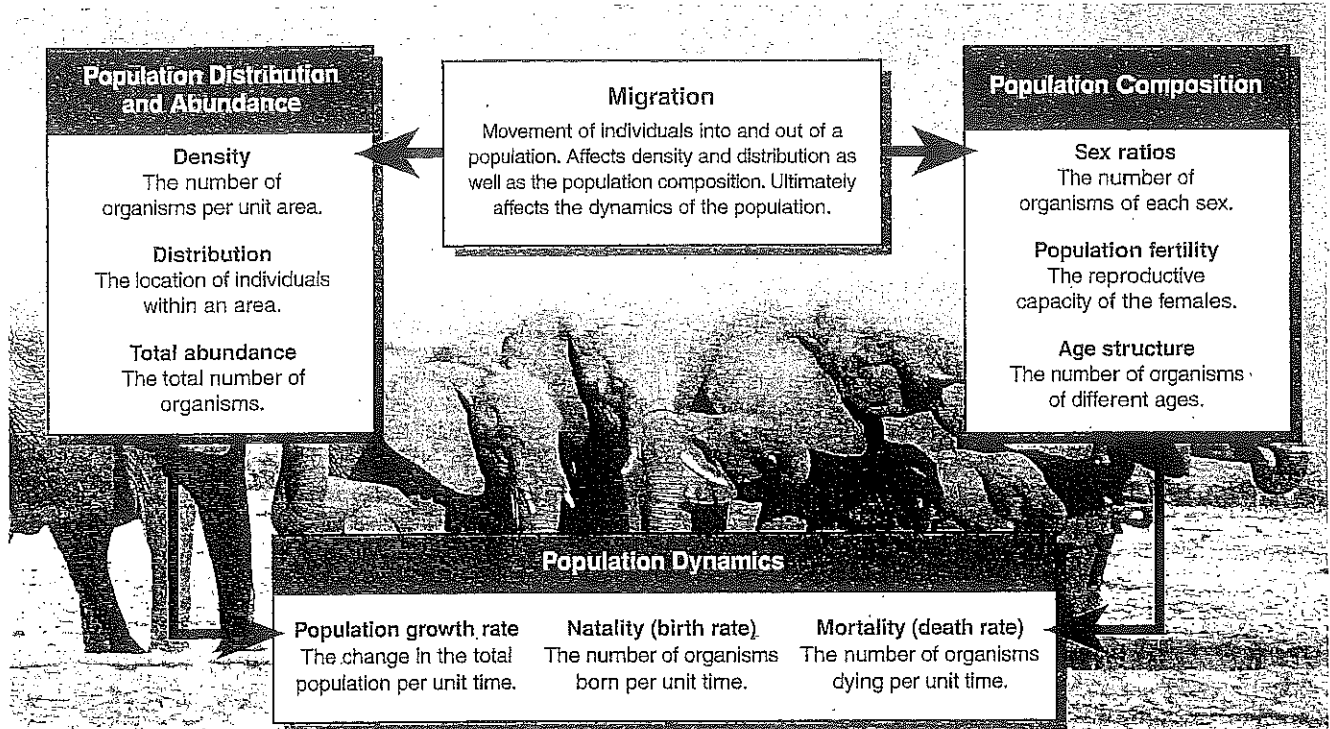


# Features of Populations

Populations have a number of attributes that may be of interest. Usually, biologists wish to determine **population size** (the total number of organisms in the population). It is also useful to know the **population density** (the number of organisms per unit area). The density of a population is often a reflection of the **carrying capacity** of the environment, i.e. how many organisms an environment can support. Populations also have structure; particular ratios of different ages and sexes. These data enable us to determine whether the population is declining or increasing in size. We can also look at the **distribution** of organisms within

their environment and so determine what particular aspects of the habitat are favoured over others. One way to retrieve information from populations is to **sample** them. Sampling involves collecting data about features of the population from samples of that population (since populations are usually too large to examine in total). Sampling can be carried out directly (by sampling the population itself using appropriate equipment) or indirectly (e.g. by monitoring calls or looking for droppings or other signs). Some of the population attributes that we can measure or calculate are illustrated on the diagram below.



Name: \_\_\_\_\_

1. What is population density? \_\_\_\_\_  
\_\_\_\_\_
2. What is the carrying capacity? \_\_\_\_\_  
\_\_\_\_\_
3. What are 2 different ways that an ecologist could sample a population? \_\_\_\_\_  
\_\_\_\_\_
4. What does the term population distribution mean? \_\_\_\_\_  
\_\_\_\_\_

5. How do each of the following effect population density?

a. Migration \_\_\_\_\_

\_\_\_\_\_

b. Natality \_\_\_\_\_

\_\_\_\_\_

c. Mortality \_\_\_\_\_

\_\_\_\_\_

6. What are 3 things which an ecologist would look at if they want to write a report on a population's composition?

\_\_\_\_\_

\_\_\_\_\_

7. Why would an ecologist want to sample a population of deer? (thinking)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

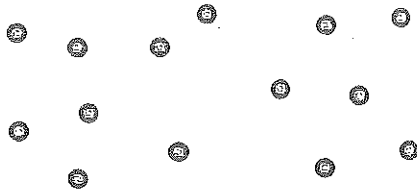
\_\_\_\_\_

# Density and Distribution

Distribution and density are two interrelated properties of populations. Population density is the number of individuals per unit area (for land organisms) or volume (for aquatic organisms). Careful observation and precise mapping can determine the

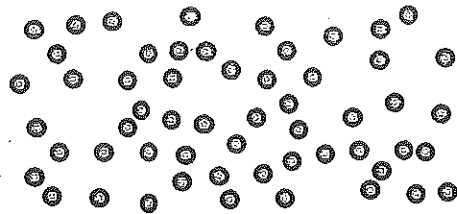
distribution patterns for a species. The three basic distribution patterns are: random, clumped and uniform. In the diagram below, the circles represent individuals of the same species. It can also represent populations of different species.

## Low Density



In low density populations, individuals are spaced well apart. There are only a few individuals per unit area or volume (e.g. highly territorial, solitary mammal species).

## High Density



In high density populations, individuals are crowded together. There are many individuals per unit area or volume (e.g. colonial organisms, such as many corals).

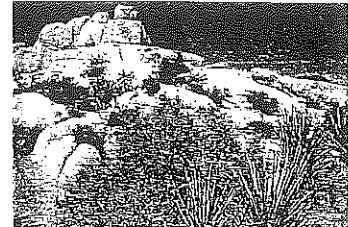
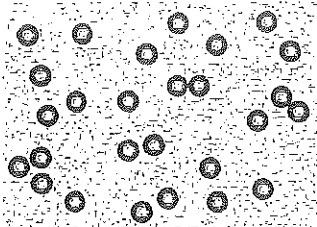


Tigers are solitary animals, found at low densities.



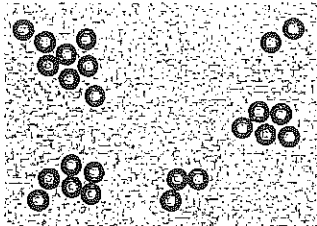
Termites form well organised, high density colonies.

## Random Distribution



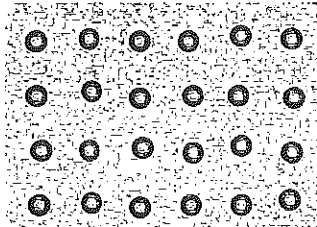
Random distributions occur when the spacing between individuals is irregular. The presence of one individual does not directly affect the location of any other individual. Random distributions are uncommon in animals but are often seen in plants.

## Clumped Distribution



Clumped distributions occur when individuals are grouped in patches (sometimes around a resource). The presence of one individual increases the probability of finding another close by. Such distributions occur in herding and highly social species.

## Uniform Distribution



Regular distribution patterns occur when individuals are evenly spaced within the area. The presence of one individual decreases the probability of finding another individual very close by. The penguins illustrated above are also at a high density.

Name: \_\_\_\_\_

1. What are the 3 basic distribution patterns? Explain what each would look like.

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_

2. What is meant by the terms in terms of populations.

- a. Low density \_\_\_\_\_
- b. High density \_\_\_\_\_

3. What type of organisms would you find in:
- a. Low density populations \_\_\_\_\_
  - b. High density populations \_\_\_\_\_
4. Describe why some organisms may exhibit a clumped pattern because of:
- a. Resources in the environment \_\_\_\_\_  
\_\_\_\_\_
  - b. Group social behavior \_\_\_\_\_  
\_\_\_\_\_
5. What type of organism would exhibit random distribution? \_\_\_\_\_  
\_\_\_\_\_
6. What type of organism would exhibit uniform distribution? \_\_\_\_\_  
\_\_\_\_\_