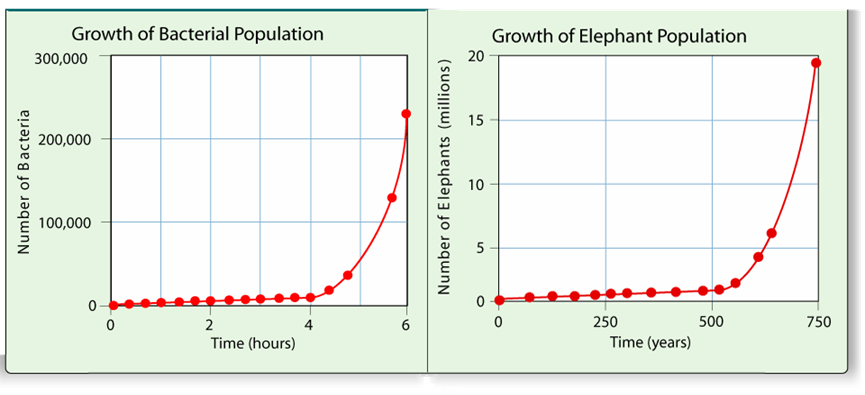
**Chapter 5 – Populations**

Section 1 – How Populations Grow

Review – Define Population: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* Characteristics of Populations
  + Three important characteristics of a population are its:
    - **geographic distribution**
    - **density**
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rate**
  + Geographic distribution, or range, describes the area inhabited by a population.
  + **Population density** is the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ per unit area.
  + Growth rate is the increase or decrease of the number of individuals in a population over time.
* What factors affect population size?
  + Three factors can affect population size:
    - **the number of births**
    - **the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - **the number of individuals that enter or leave the population**
    - A population can grow when its birthrate is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than its death rate.
  + **Immigration**, the movement of individuals into an area, is another factor that can cause a population to grow.
    - Populations can increase by immigration as animals in search of mates or food arrive from outside.
  + **Emigration**, the movement of individuals \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an area, can cause a population to decrease in size.
    - Emigration can occur when animals leave to find mates and establish new territories.
    - A shortage of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in one area may also lead to emigration.
* What are exponential growth and logistic growth?
* Exponential Growth
  + Under ideal conditions with unlimited resources, a population will grow exponentially.
  + Exponential growth occurs when the individuals in a population \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at a constant rate.
  + The population becomes larger and larger until it approaches an infinitely large size.



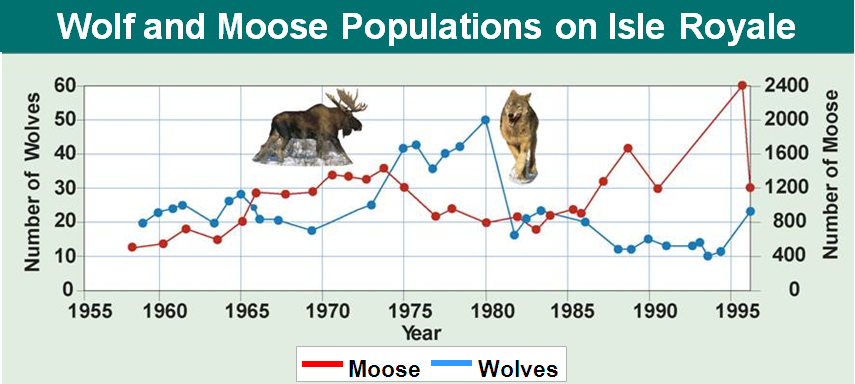
* Logistic Growth
  + In nature, exponential growth does not continue in a population for very long.
  + As resources become less available, the growth of a population slows or \_\_\_\_\_\_\_\_\_\_\_\_.
  + Logistic growth occurs when a population's growth slows or stops following a period of exponential growth.



* Carrying Capacity
  + The largest number of individuals of a population that a given environment can support is called its **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ capacity**.
  + When a population reaches the carrying capacity of its environment, its growth levels off. The average growth rate is zero.

Section 2 – Limits to Growth

* What factors limit population growth?
* Limiting Factors
  + The primary productivity of an ecosystem can be reduced when there is an insufficient supply of a particular nutrient.
  + Ecologists call such substances limiting nutrients.
  + A limiting nutrient is an example of a more general ecological concept: a limiting factor.
  + In the context of populations, a **limiting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** is a factor that causes population growth to decrease.
* Density-Dependent Factors
  + A limiting factor that depends on population size is called a **density-dependent limiting factor**.
  + Density-dependent limiting factors include:
    - **competition**
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
    - **parasitism**
    - **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
  + Density-dependent factors operate only when the population density reaches a certain level. These factors operate most strongly when a population is \_\_\_\_\_\_\_\_\_\_ and dense.
  + They do not affect small, scattered populations as greatly.
* Competition
  + When populations become crowded, organisms compete for food, water space, sunlight and other essentials.
  + Competition among members of the same species is a density-dependent limiting factor.
  + Competition can also occur between members of different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + This type of competition can lead to evolutionary change.
  + Over time, the species may evolve to occupy different niches.
* Predation
  + Populations in nature are often controlled by predation.
  + The regulation of a population by predation takes place within a **predator-\_\_\_\_\_\_\_\_\_\_\_\_ relationship**, one of the best-known mechanisms of population control.

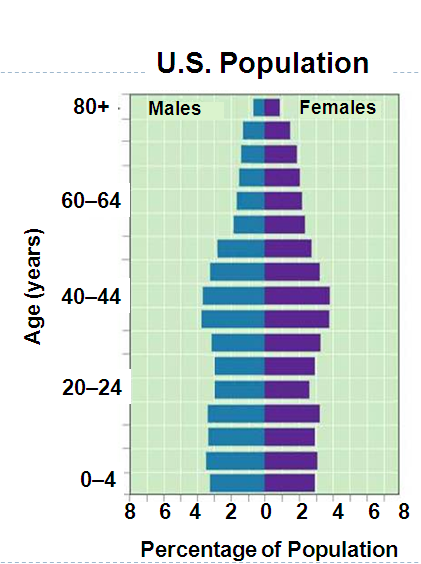
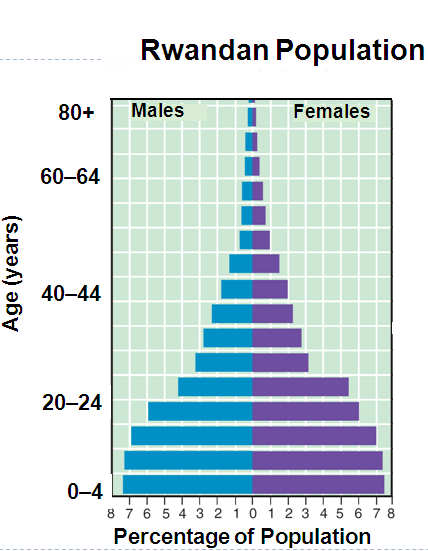


* Parasitism and Disease
  + Parasites can limit the growth of a population.
  + A parasite lives in or on another organism (the host) and consequently \_\_\_\_\_\_\_\_\_\_\_\_ it.
* Density-Independent Factors
  + **Density-independent limiting factors** affect all populations in similar ways, regardless of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ size.
* Examples of density-independent limiting factors include:
  + **unusual weather**
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ disasters**
  + **seasonal cycles**
  + **certain human activities—such as damming rivers and clear-cutting forests**

Section 3 – Human Population Growth

* How has the size of the human population changed over time?
* Historical Overview
  + Like the populations of many other living organisms, the size of the human population tends to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with time.
  + For most of human existence, the population grew slowly.
  + Limiting factors kept population sizes low.
  + About 500 years ago, the human population began growing more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + Life was made easier and safer by advances in agriculture and industry.
  + Death rates were dramatically reduced due to improved sanitation, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and healthcare, while birthrates remained high.
  + With these advances, the human population experienced exponential growth.



* Patterns of Population Growth
  + The scientific study of human populations is called **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**
  + Demography examines the characteristics of human populations and attempts to explain how those populations will change over time.
* Why do population growth rates differ in countries throughout the world?
  + Birthrates, death rates, and the age structure of a population help predict why some countries have high growth rates while other countries grow more slowly.
* The Demographic Transition
  + Over the past century, population growth in the United States, Japan, and much of Europe has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dramatically.
  + According to demographers, these countries have completed the **demographic transition**, a dramatic change in birth and death rates.
* The demographic transition has three stages.
  + In stage 1, there are high death rates and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ birthrates.
  + In stage 2, the death rate drops, while the birthrate remains high. The population \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rapidly.
  + In stage 3, the birthrate decreases, causing population growth to slow.
  + The demographic transition is complete when the birthrate falls to meet the death rate, and population growth stops.
* Age Structure
  + Population growth depends, in part, on how many people of different ages make up a given population.
  + Demographers can predict future growth using models called **age-structure diagrams.**
  + Age-structure diagrams show the population of a country broken down by gender and \_\_\_\_\_\_\_\_\_\_\_\_ group.
* In the United States, there are nearly equal numbers of people in each age group.
  + This age structure diagram predicts a slow but steady growth rate for the near future.
* In Rwanda, there are many more young children than teenagers, and many more teenagers than adults.
  + This age structure diagram predicts a population that will \_\_\_\_\_\_\_\_\_\_ in about 30 years.
* Ecologists suggest that if growth does not slow down, there could be serious damage to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and global economy.
* Economists assert that science, technology, and changes in society may control the negative impact of population growth.