

**Standard**: Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

**Element**: Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.

**EQ**: What affects the growth of populations?

A large part of ecology is the study of how populations change over time.

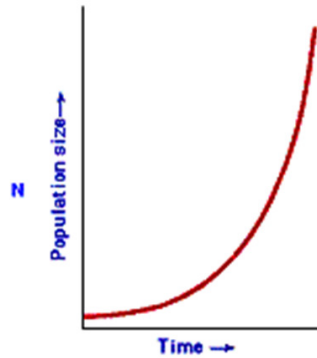
Depending on the resources available, populations can grow at different rates.

**Exponential growth** happens when organisms continuously grow at an increasing rate, and

**Logistic growth** happens when the population levels off after a certain amount of growth.

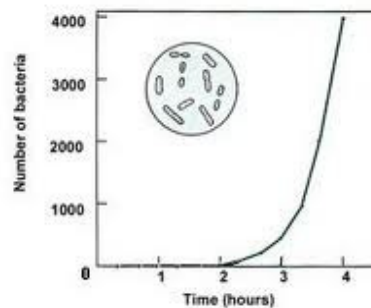
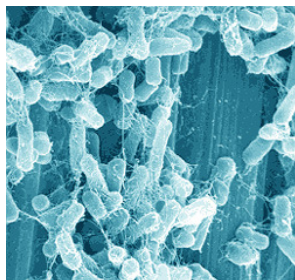
# 1. Exponential Growth

- Growth in which numbers increase at an increasing rate
- Starts out slowly and increases rapidly
- Represented by a J curve on a graph



Bacteria often grow at an exponential rate. Because they are so small and require so few resources, cells can continue to multiply very rapidly until they start to run out of resources.

Bacterial infections can make you sick very quickly because of the exponential growth of the bacteria in your body.

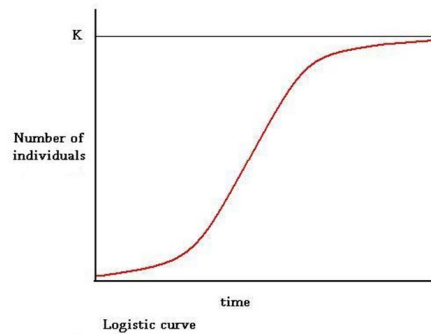


## 2. Logistic Growth

Starts growing slowly, then rapidly increases to a maximum depending on the carrying capacity.

**Carrying capacity**– largest population that an environment can support at any given time

Represented on a graph as an S curve.



Most populations have a logistic growth pattern.

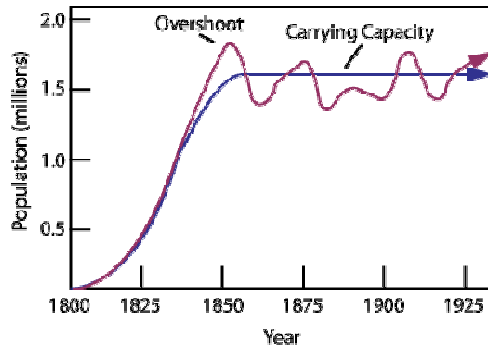
The number of raccoons in Oglethorpe County is staying fairly constant. The number of raccoons increased until it reached the maximum amount that the environment could support, and then stayed steady.



## Carrying Capacity

The carrying capacity represents the maximum number of individuals that can exist in a population with the current resources.

If a population overshoots its carrying capacity, it will crash because all organisms won't be able to survive.



## Determining Population Size

Most natural populations do not grow exponentially (at least not for very long).

Competition between organisms for limited resources determines how large a population can get.

Whatever resource is in such short supply that it determines the maximum size of a population is called a **limiting factor**.

### Factors that Affect Population Growth

- Some factors have a larger effect on the population the larger it gets, these are called **density-dependent limiting factors**.

*Examples:*

- disease
- competition for food or shelter



### Factors that Affect Population Growth

- Some factors affect a population equally no matter how large it is; these are called **density-independent limiting factors**.

*Examples:*

- drought
- storms
- climate



On a sheet of notebook paper, complete the "Quick Lab" on page 105 of the biology book and answer the analysis questions #1-4.

