***Population Dynamics, Carrying Capacity, and Conservation Biology***

**Major Characteristics of a Population**

Populations can change in:

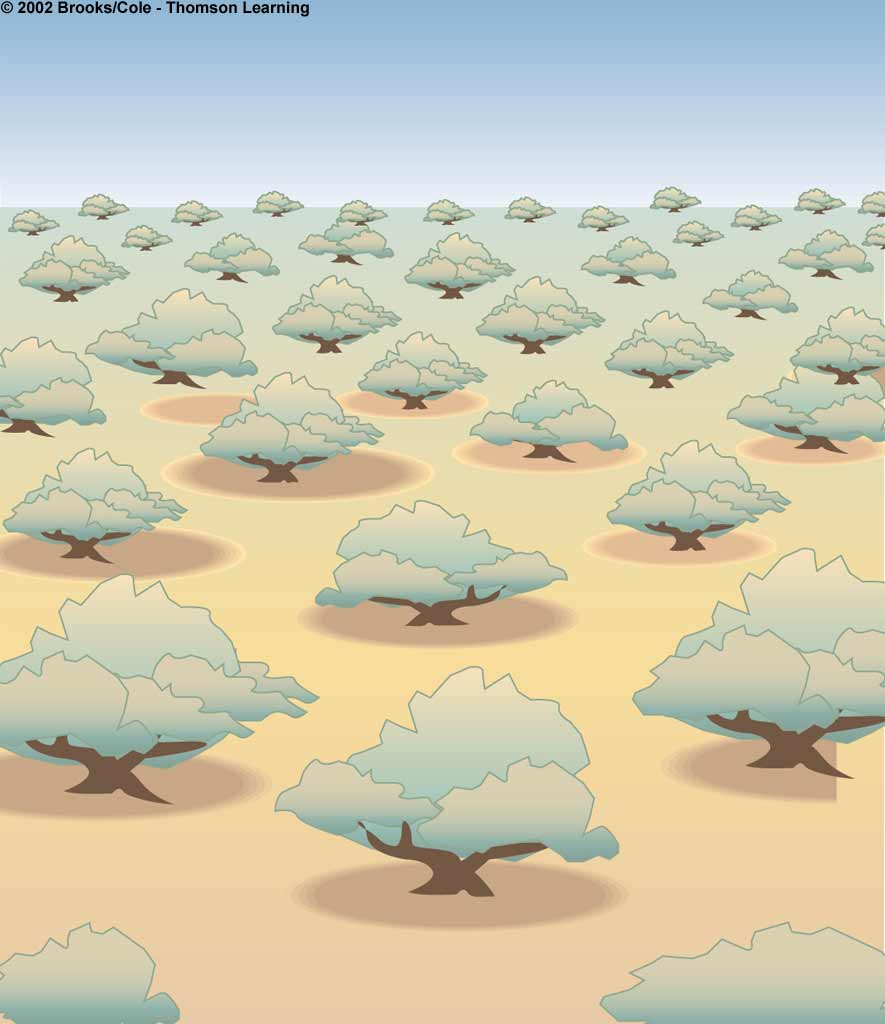
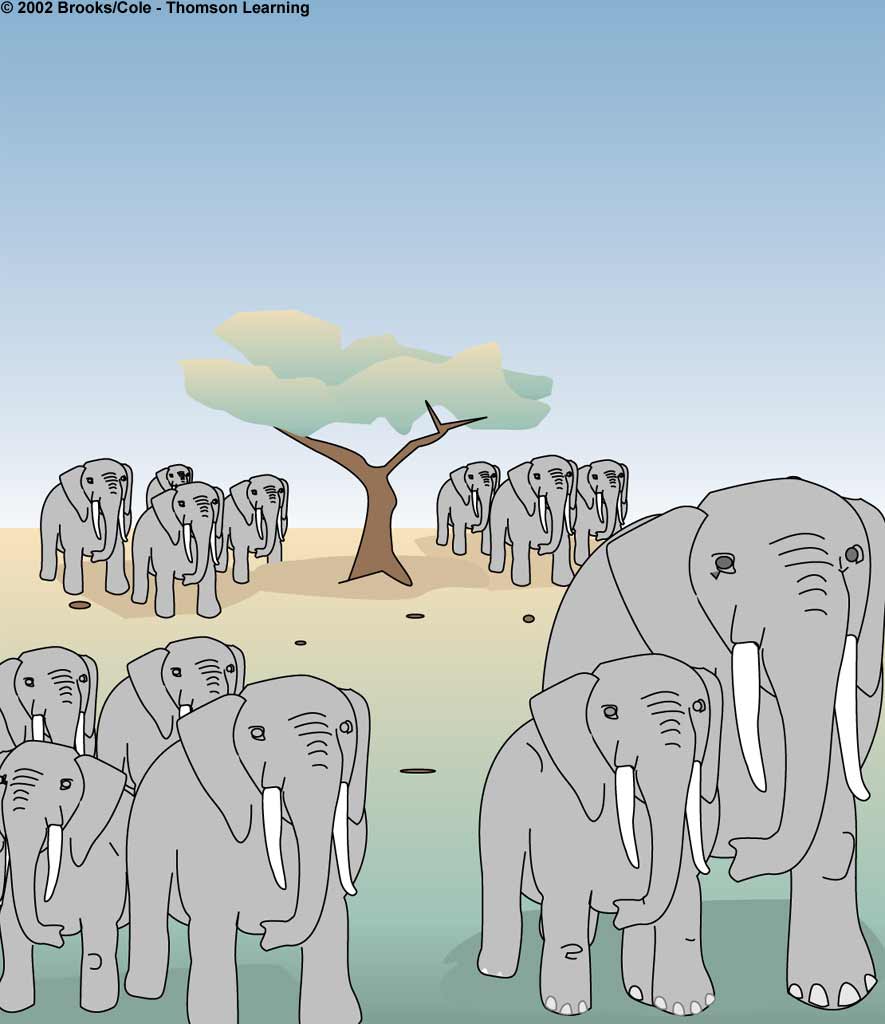
1.

2.

3.

4.

**Dispersion**



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

These changes are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

They occur in response to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or changes in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**What limits population growth?**

1.

2.

3.

4.

Population growth = (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) – (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

Populations vary in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (growth)

Intrinsic rate of increase-

**Characteristics of populations with high intrinsic rates** **of increase**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ early in life
* Short \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_times
* Reproduce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_times
* Many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ each time they reproduce

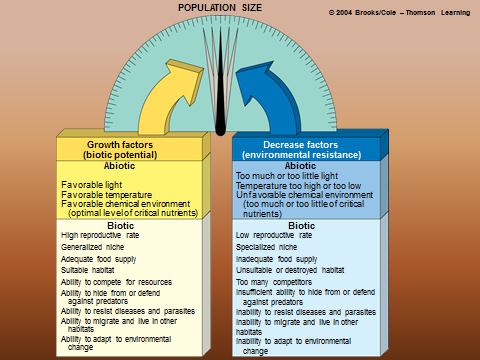
*Example*:

But, of course, this is not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because no population can grow \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

There are always \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factors!

Environmental resistance includes:

Together, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ determine the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.



Carrying Capacity-

Minimum Viable Population-

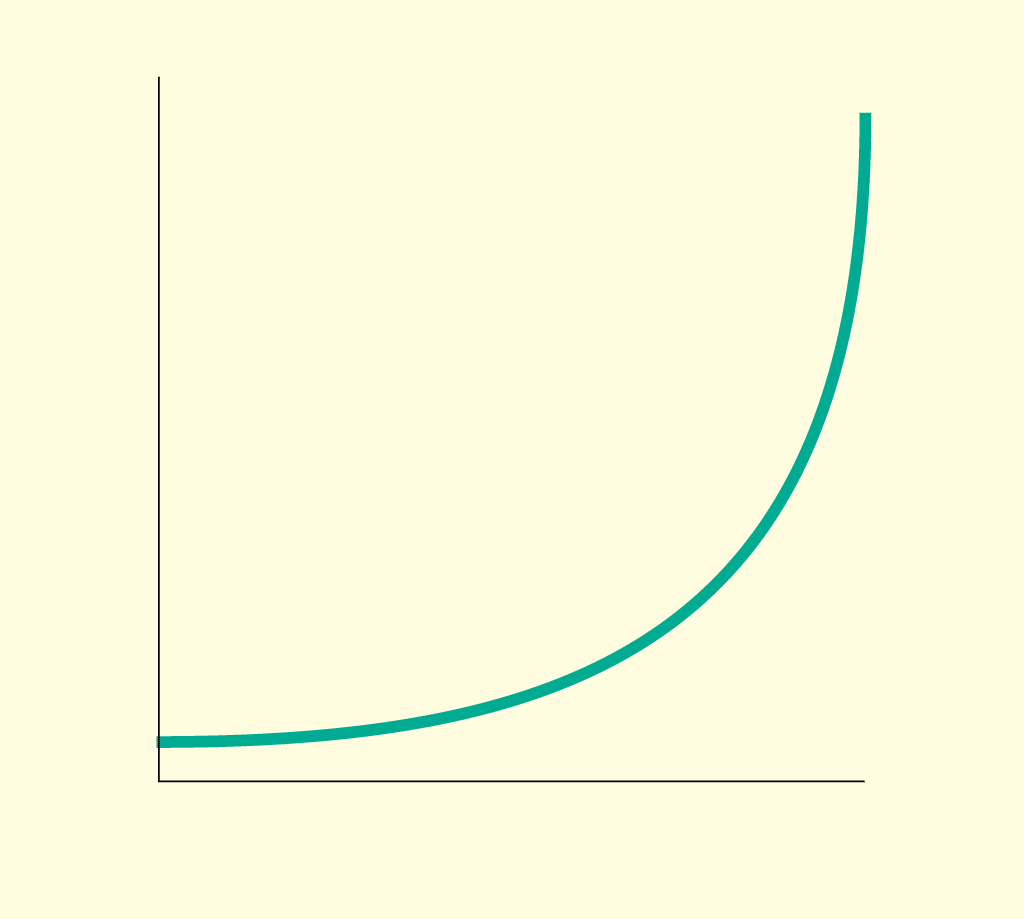
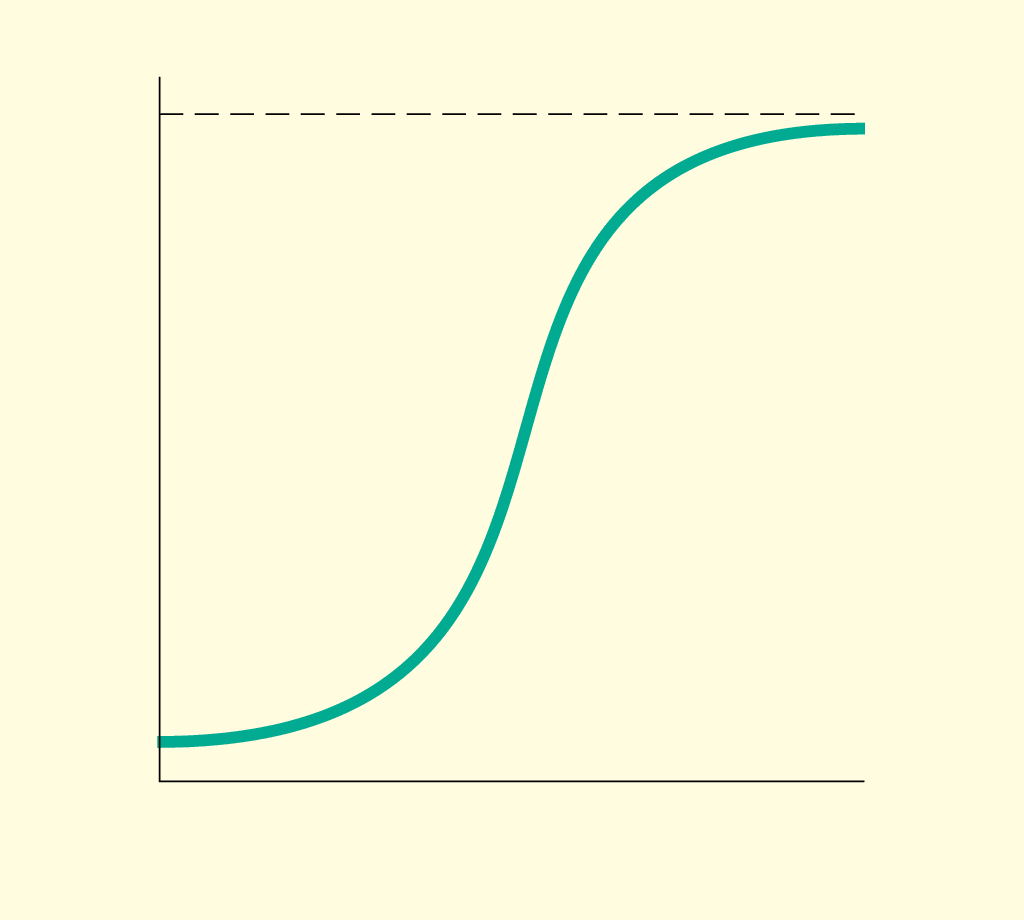
**Exponential and Logistic Growth**

A population has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ growth when it has few/no resource \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_-shaped curve

Logistic Growth-

\_\_\_\_\_\_-shaped curve



**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

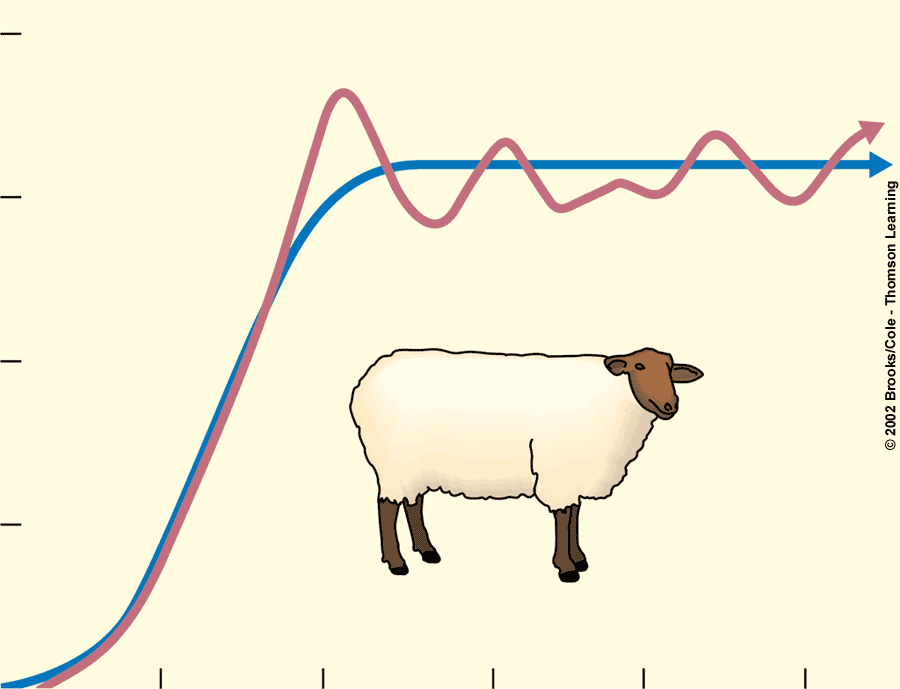
**What Happens if Population Size Exceeds Carrying Capacity?**

Overshoot**-**

Dieback**-**

**\_\_\_\_\_\_\_\_\_\_** are not exempt from this!

*Example*: potato fungus in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; 1 million people died/3 million \_\_\_\_\_\_\_\_\_\_

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**Overshoot**

**How Does Density Affect Population Growth?**

Density-independent population controls-

*Examples*:

Density-depending population controls-

*Examples*:

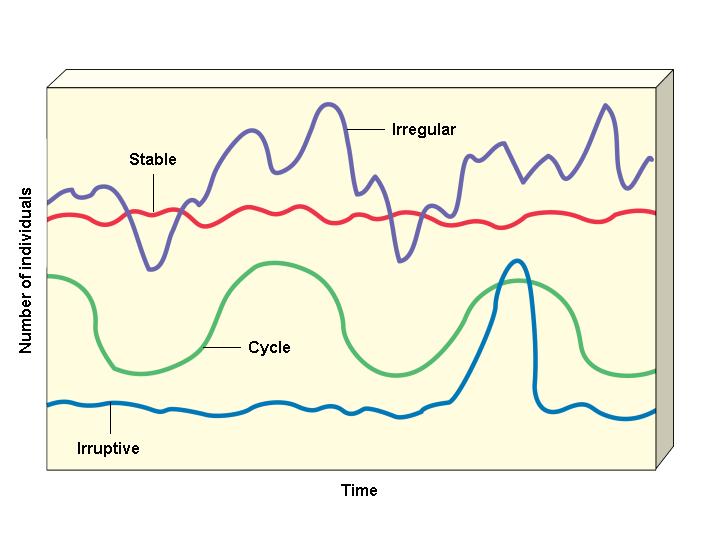
**Population Curves in Nature**

Stable:

Irruptive:

Irregular:

Cyclic:

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**Do Predators Control Population Size?**

Lynx-Hare Cycle:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of hares reduces \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ population

Hare population builds up because there are fewer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

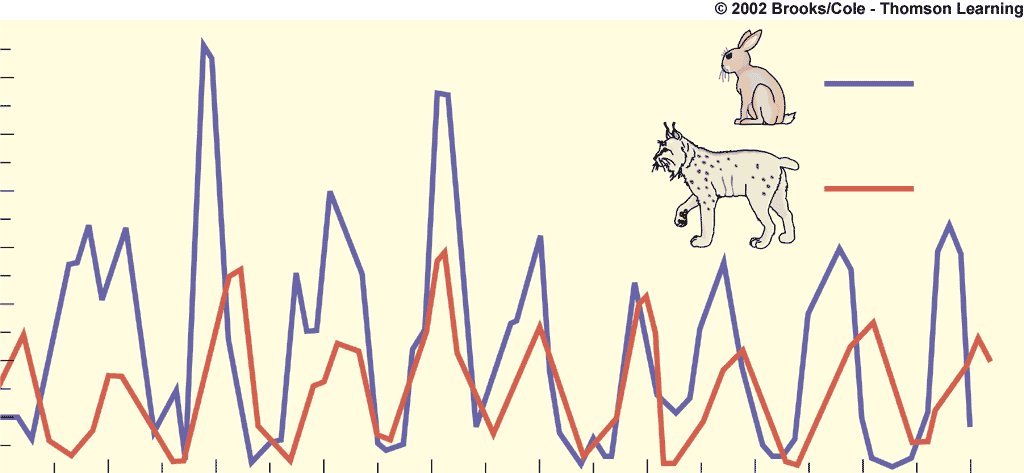
Lynx population \_\_\_\_\_\_\_\_\_\_\_ because there are more \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Cycle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ again.

**Two Ideas About the Lynx-Hare Cycle**

1. Top-down control hypothesis:

2. Bottom-up control hypothesis:



**Reproductive Patterns and Survival**

Asexual reproduction:

Sexual Reproduction:

r-selected Species: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species; high \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ rate of increase; reproduce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

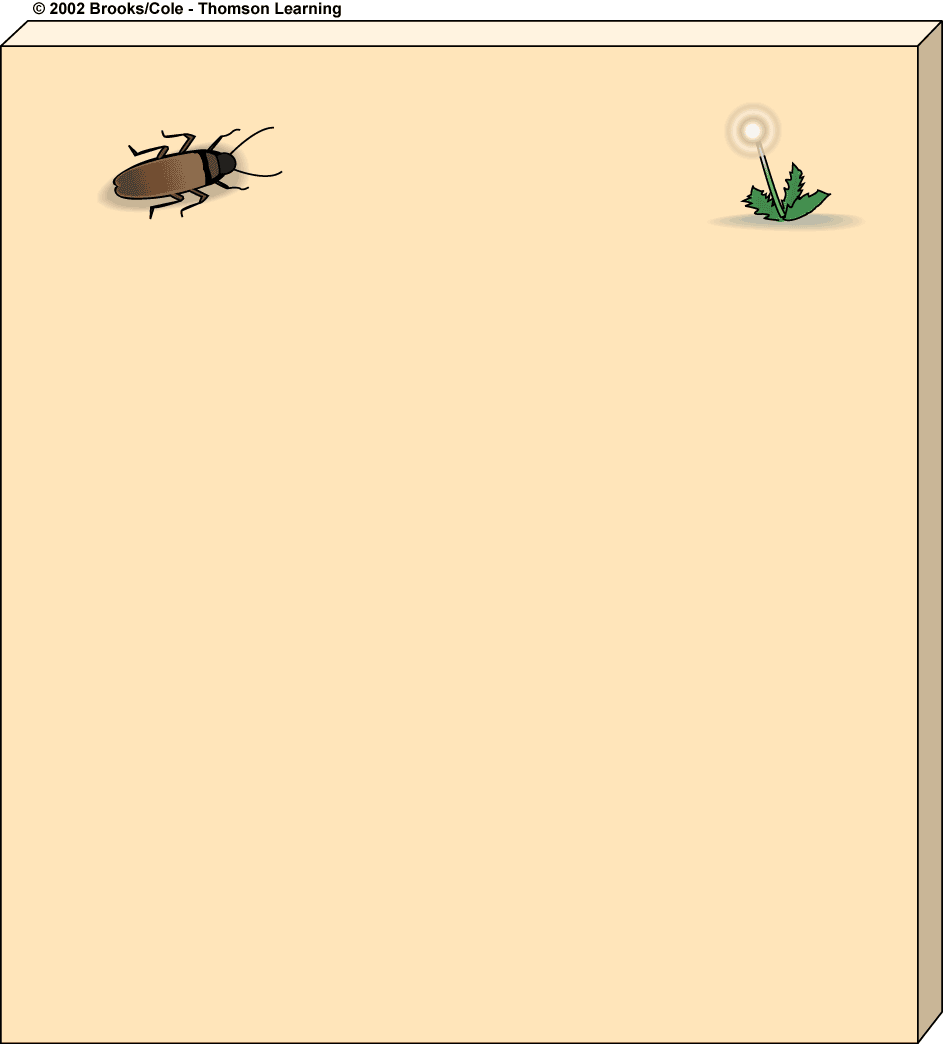
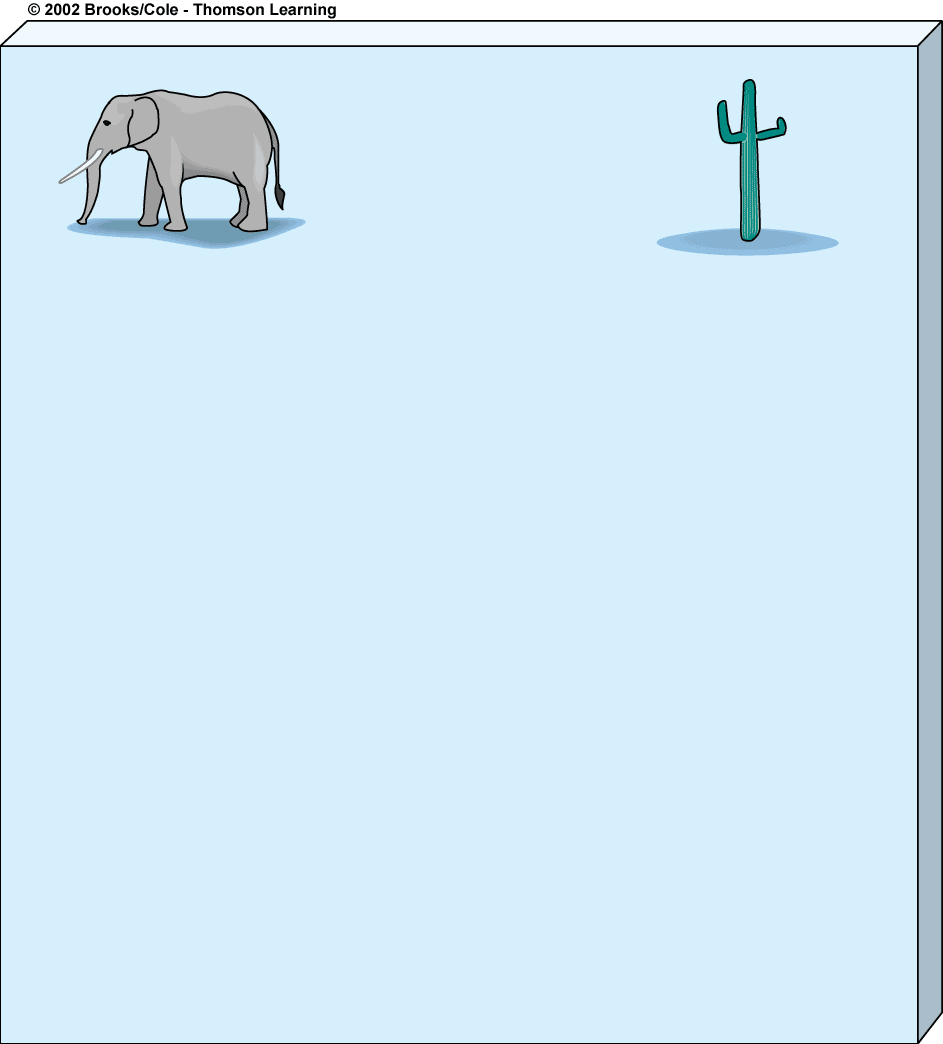
*Examples*:

* + - Many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ each time they reproduce
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at a young age
    - Short \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ times
    - Little or no \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ care
    - Short \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ changes in population size

K-selected Species: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ species

*Examples*:

* + - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ late in life
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ offspring
    - Long \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ times
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and protect their young
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ growth curve

**K-Selected Species**

**Fewer, larger offspring**

**High parental care and protection of offspring**

**Later reproductive age**

**Most offspring survive to reproductive age**

**Larger adults**

**Adapted to stable climate and environmental**

**conditions**

**Lower population growth rate (r)**

**Population size fairly stable and usually close**

**to carrying capacity (K)**

**Specialist niche**

**High ability to compete**

**Late successional species**

**Many small offspring**

**Little or no parental care and protection of offspring**

**Early reproductive age**

**Most offspring die before reaching reproductive age**

**Small adults**

**Adapted to unstable climate and environmental**

**conditions**

**High population growth rate (r)**

**Population size fluctuates wildly above and below**

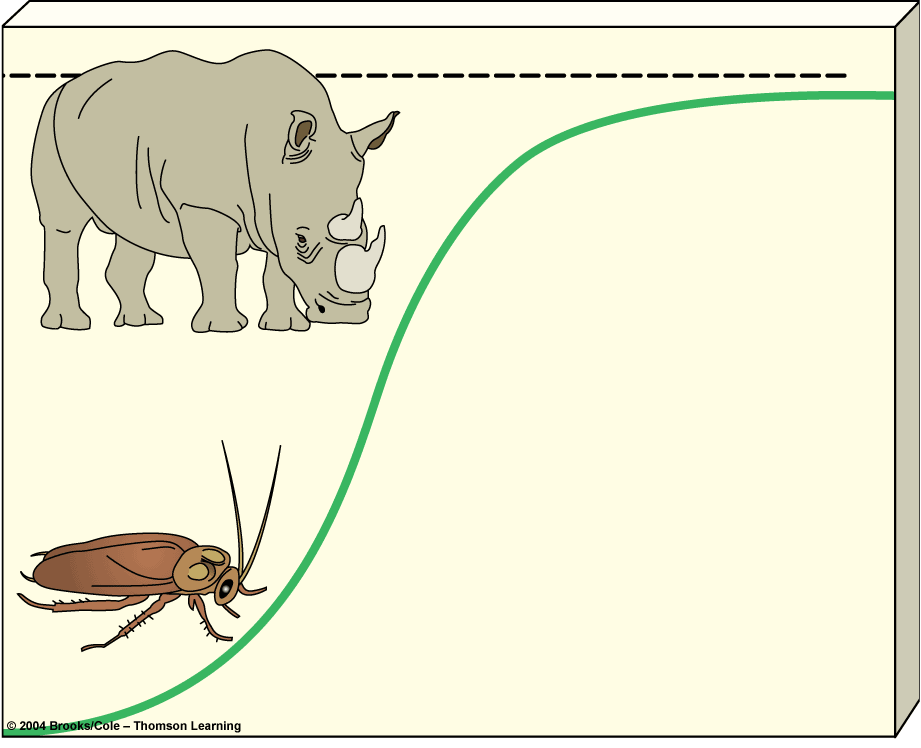
**carrying capacity (K)**

**Generalist niche**

**Low ability to compete**

**Early successional species**

**r-Selected Species**

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***K* species;**

**experience**

***K* selection**

***r* species;**

**experience**

***r* selection**

**Survivorship Curves**

Shows the number of survivors of each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for a species.

***3 Types***:

1. Late Loss Curves:

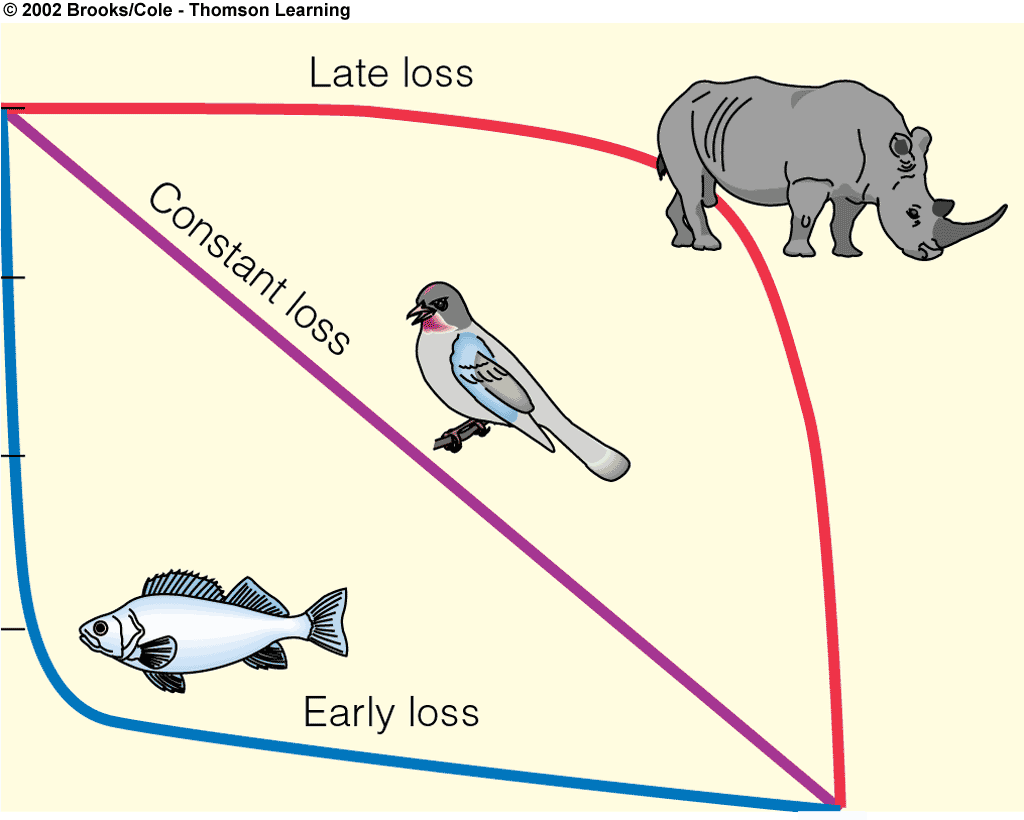
*Example*:

2. Constant Loss Curves:

*Example*:

3. Early Loss Curves:

*Example*:



**Conservation Biology**

Uses science to take action to preserve \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

***3 Principles***:

1. Biodiversity is necessary to all life on earth and should not be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_by humans
2. Humans should not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ vital ecological processes
3. The best way to preserve earth’s biodiversity is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ecosystems