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

****

**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:

****

**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**

****

***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