

Name: _____ Period: _____ Date: _____

[Predator Prey Relations and Invasive Species Virtual Lab](#)



Close Reading: Read, Annotate, and Answer Questions about the following reading section.

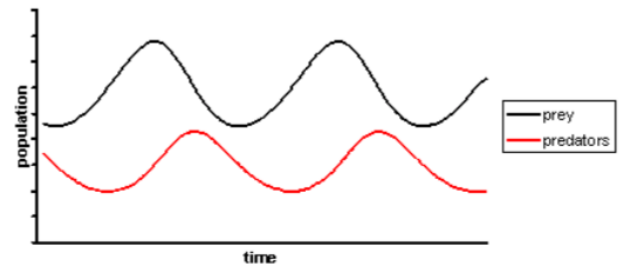
Predation

In an ecosystem, species interact with each other and can have positive, negative, or neutral impacts on each other. Predation is an interaction between two organisms where the predator consumes the prey. Both are usually heterotrophs (organisms that cannot produce their own food) and rely on obtaining nutrition from other sources such as plants or other organisms. When the prey organism is a plant, this is referred to as herbivory. Predators differ from decomposers because predators get their energy from organisms that are either living or recently killed while decomposers break down leftover remains of organisms that have died.



Population Dynamics of Predators and Prey

A population is a number of organisms of the same species that live in the same area at the same time. The population size of predators and prey in a community are usually constantly changing as more or less resources become available. Usually, when the population of predators increases, they are able to hunt more prey, thus reducing the population size of the prey. With a decreased food source, some predators will starve and die off, reducing the predator population size. After the predator population decreases, there will be less threat to the prey, which allows the prey population to increase. Ultimately this will replenish the food source for the predator population. This pattern usually continues throughout the years where there is no constant carrying capacity for the ecosystem.



Predators, however, are not the only factor that control the prey population. If the prey is an herbivore, then the amount of plant growth in the area also has an effect on the prey population. For example, if a wildfire burns away most of the plant growth, the food supply for the prey will be reduced causing a reduction in the prey population size. With less prey available, the predator population will also decrease.

Adaptations/Defense Mechanisms

Organisms have certain traits/characteristics that allow them to survive and thrive in their environment more than others. These traits are called adaptations. Predator and prey interactions are usually a driving force for some of these adaptations. Predators need to be able to find and catch their prey while prey need to avoid being eaten by predators. This is why most predators have

evolved to have excellent senses and speed. Prey, however, can have a variety of defenses to avoid being eaten.

Prey defenses might be mechanical, chemical, physical, or behavioral. Mechanical defense examples include thorns on plants or hard shells on turtles. Chemical defenses are usually in the form of toxins or bad smelling odors. An example of physical/behavioral defenses include camouflage by blending in with their environment, or mimicking other poisonous/toxic organisms.



Batesian Mimic
(parasitic benefit)

Müllerian Mimics
(mutual benefit)



Deceptive signal
Hoverfly harmless

Honest signal
Wasp can sting

Honest signal
Bee can sting

Invasive Species

Invasive species are species that are not usually found in a certain ecosystem and can cause significant harm when introduced to a new area. An invasive species is harmful to an ecosystem because they throw off the balance of interactions between species currently in the ecosystem, especially when the invasive species can outcompete the original species. One example of an invasive species is the Kudzu plant, that was introduced to the United States from Asia as a way to reduce soil erosion, which worked very well. However, the people did not realize that the plant can grow as much as one foot per day and began suffocating the other plants nearby, stealing their resources and diminishing the natural biodiversity of the ecosystem.

Reading Questions:

1. What is predation?

2. How does predation differ from decomposition?

3. What will happen to the predator population when the prey population increases?

4. How does the predator population affect the prey population?

5. What are 3 types of prey defenses?

6. What are invasive species and how do they affect an ecosystem?

Virtual Lab:

Online: <https://bit.ly/2gtDKvN> If the program does not open up in Chrome, try a different browser

Program download: https://drive.google.com/open?id=1CBVhQ0mFCsmTV6w-N5J_yLdCByex_bVF

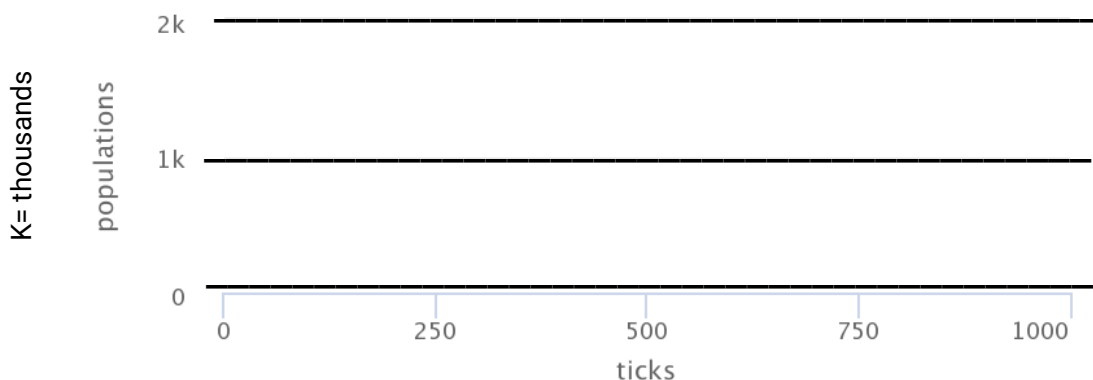
Purpose: To investigate the relationship between predator and prey populations, resource availability, and the impact of invasive species.

Procedure:

1. Open the virtual lab.
2. Set the following parameters:
 - Amount of grassland = 100%
 - Initial number bugs = 100
 - Initial number birds = 30
 - min reproduce energy = 30
 - amount of food bugs eat = 4
 - % grass to burn = 50%
 - % of bugs to remove = 50%
3. Trial 1 will not include invasive species or grass burn. Click “set up” and “go” to start the simulation. You will let the simulation run the entire time (1000 ticks) recording data every 250 ticks. **Carefully** and **accurately** draw the graph illustrating each population (make a color coded key).

Time (ticks)	Bug Population	Bird Population	Grass Population
0	100	30	1300
250			
500			
750			
1000			

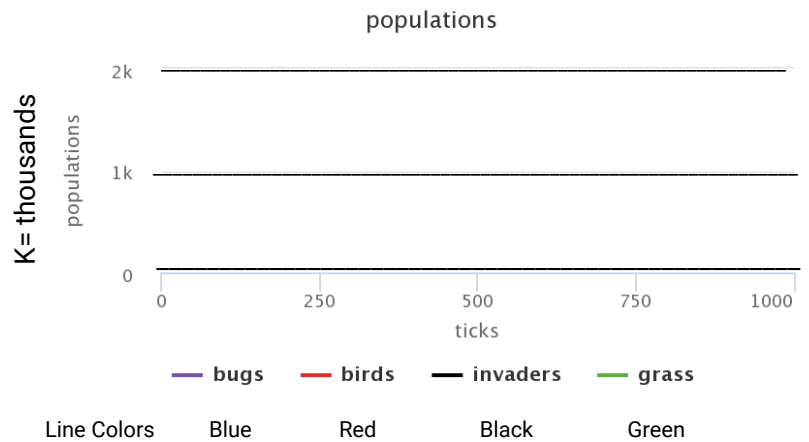
Do NOT just sketch the graph from the computer. Plot the data for each population using the specific color.
populations



Line Colors — bugs Blue — birds Red — invaders Black — grass Green

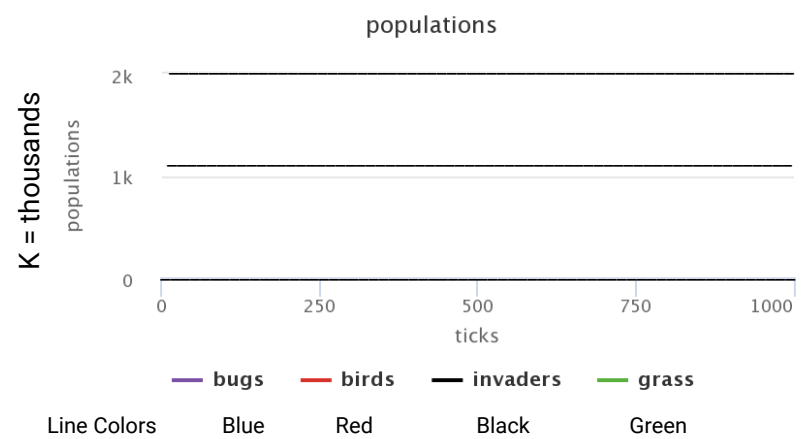
4. Trial 2 will illustrate grass burn: Click "Setup" and "go" to restart the simulation. At 250, 500, 750, and 1000 ticks, click "burn down the grass". Record data and carefully draw the graph.

Time (ticks)	Bug Population	Bird Population	Grass Population
0	100	30	1300
250			
500			
750			
1000			



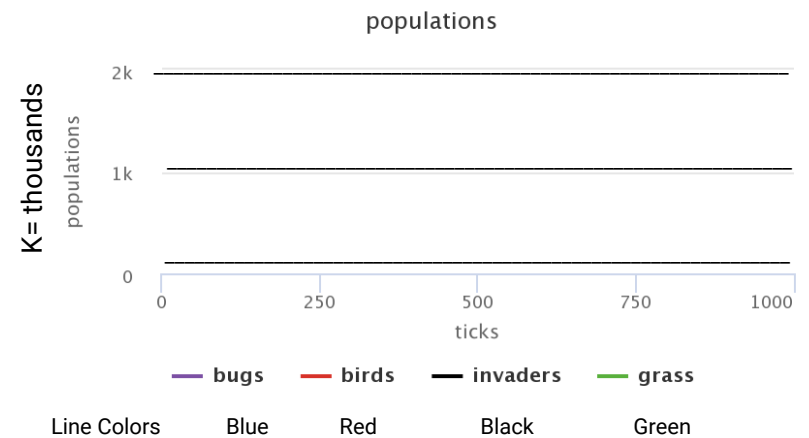
5. Trial 3 will illustrate remove bugs: Click "Setup" and "go" to restart the simulation. At 250, 500, 750, and 1000 ticks, remove the bugs.

Time (ticks)	Bug Population	Bird Population	Grass Population
0	100	30	1300
250			
500			
750			
1000			



6. Trial 4 will illustrate invasive species: Click "Setup" and "go" to restart the simulation. At 250 ticks, launch the invasion. Record data and carefully draw the graph.

Time (ticks)	Bug Population	Bird Population	Grass Population
0	100	30	1300
250			
500			
750			
1000			



Data Analysis/Conclusion Questions:

1. In trail 1, when the grass population is low, what is the size of the prey population? What is the size of the predator population? Explain these relationships.

2. In trial 2, what happens to the grass population, prey population, and predator population when the grass is burned? Why does this happen?

3. In trial 3, how does removing the bugs affect the grass population? How does it affect the predator population? Why does this happen?

4. In trial 4, how does an invasive species affect the grass population? The prey population? The predator population? Explain why the invasive species has this affect on each population.

5. Create a **claim** to answer the following question and support your claim with evidence and reasoning.

Claim: How do predator and prey populations interact with each other?

Evidence: What patterns can you see in your data?

Reasoning: Justify how your evidence supports your claim.

Invasive Species Research

1. Go to the following link and read about the zebra mussels and why we should care about them, then answer the following questions. https://www.usgs.gov/faqs/what-are-zebra-mussels-and-why-should-we-care-about-them?qt-news_science_products=0#qt-news_science_products (shortened version: <https://on.doi.gov/2EA8o5q>) You will need to click on the articles below to answer the other questions!

2. Where are zebra mussels usually found? Where did they invade? How did they probably get there?

3. What are some ways that zebra mussels negatively impact their ecosystem?

4. How can the spread of zebra mussels be prevented? (<https://on.doi.gov/2WCO5Kf>)

5. What are snakeheads? How many eggs can a single female carry? (<https://on.doi.gov/2WDBkRc>)

6. What is an asian swamp eel? Describe the body of the asian swamp eel. Where do they spawn?

7. What is an invasive species and why are they a problem? (<https://on.doi.gov/2V9PnMp>) How much damage in dollars do non-native species cost the US each year?

8. What are some costly efforts that the US uses to reduce invasive species population? (<https://on.doi.gov/2V9PnMp>)
