

Predator Prey Lab Exercise L2

Name _____

Date _____

Objective: To compare predator and prey populations over time in a small ecosystem.

Introduction: In 1970 the deer population of a small island forest preserve was about 2000 animals. Although the island had excellent vegetation for feeding, the food supply obviously had limits. Therefore the wildlife service rangers feared that overgrazing might lead to mass starvation. Since the area was too remote for hunters, the wildlife service decided to bring in natural predators to control the deer population. It was hoped that natural predation would keep the deer population from becoming too large and also increase the deer quality (or health) since predators often pick the weaker members of the herd. In 1971, ten wolves were flown into the island.

Procedures:

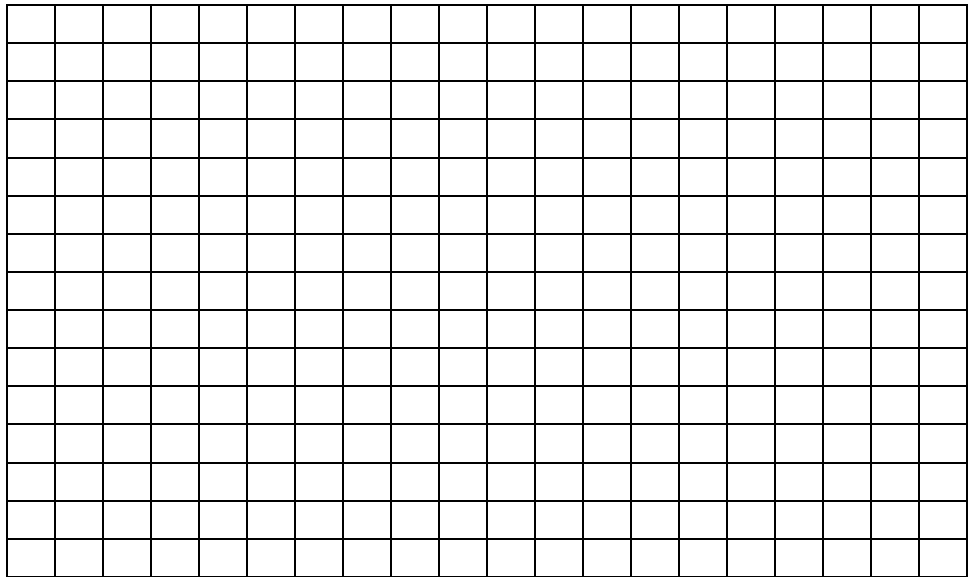
1. The results of this program are shown in the following table. The Population Change is the number of deer born minus the number of deer that died during that year. Fill out the last column for each year (the first has been calculated for you).

	Year	Wolf Population	Deer Population	Deer Born	Deer Predation	Deer Starvation	Deer Population Change
1971	0	10	2,000	800	400	100	+300
1972	1	12	2,300	920	480	240	
1973	2	16	2,500	1,000	639	498	
1974	3	22	2,363	944	891	191	
1975	4	28	2,225	996	1,114	20	
1976	5	24	2,087	836	953	2	
1977	6	21	1,968	788	840	0	
1978	7	18	1,916	766	720	0	
1979	8	19	1,962	780	760	0	
1980	9	19	1,982	790	760	0	

2. Graph the deer and wolf populations on the graph below. This information is in grey in the data table. Use different scales for the wolf population and the deer population on the y axis. For the deer population, use one box/200 deer; use one box/2 wolves for the wolf population. Use one color to show deer populations and another color to show wolf populations.
3. Connect the data points.
4. Add a title and key to your graph.

Title: _____

Deer Population



Wolf Population

Key: _____
Years

Questions:

1. Look at your graph. Describe the changes to the deer and wolf populations between 1971 and 1980 (years 0 and 9).

Deer population: _____

Wolf population: _____

2. Between what years did

- the deer population have the greatest increase? _____
- the deer population have the greatest decrease? _____
- the wolf population have the greatest increase? _____
- the wolf population have the greatest decrease? _____

3. What do you think would have happened to the deer population on the island between 1971 and 1980 (years 0 and 9) if wolves had NOT been introduced?

4. Predict what happened to the size of the deer population after 1980 (year 9). Explain your prediction.

5. Predict what your graph would look like when the ecosystem reached carrying capacity. Recall that carrying capacity is the maximum population of a given species that can survive indefinitely in a given environment.

6. Use the information from the graph to calculate the unit rates of change for the deer and wolf populations. Use the formula to complete the chart below.

$$\text{Unit Rate of Change} = \frac{\Delta \text{ Number of deer (or wolves)}}{\Delta \text{ Years}} = \frac{\Delta y}{\Delta x} = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

Graph segment Ordered Pairs	Δ Number of deer Δy	Δ Years Δx	Unit Rate of Change $\Delta y/\Delta x$
Deer population from 1971-1972 (years 0-1) (____, ____) (____, ____)			
Deer population from 1973-1976 (years 2-5) (____, ____) (____, ____)			
Graph segment	Δ Number of wolves Δy	Δ Years Δx	Unit Rate of Change $\Delta y/\Delta x$
Wolf population from 1973- 1975 (years 2-4) (____, ____) (____, ____)			
Wolf population from 1976- 1978 (years 5-7) (____, ____) (____, ____)			

7. What does a positive (+) unit rate of change tell you about a population?
What does a negative (-) unit rate of change tell you about a population?

Final thoughts:

Most biology textbooks describe that predators and prey exist in a balance. This "balance of nature" hypothesis has been criticized by some scientists because it suggests a relationship between predators and prey that is good and necessary.

Opponents of this hypothesis propose the following questions:

- Why is death by predators more natural or "right" than death by starvation?
- How does one determine when an ecosystem is in "balance"?
- Do predators really kill only the old and sick prey? What evidence is there for this statement?

What is your opinion of the balance of nature hypothesis? Would the deer on the island be better off, worse off, or about the same without the wolves? Defend your position.