

Lab: Predation or Starvation

ECOLOGY

Introduction: In ecology, **predation** describes a biological interaction where a **predator** (an organism that is hunting) feeds on its **prey** (the organism that is attacked). Predators may or may not kill their prey prior to feeding on them, but the act of predation always results in the death of its prey and the eventual absorption of the prey's tissue through consumption. This includes predator-prey, herbivore-plant, and parasite-host interactions. These linkages are the prime movers of energy through **food chains**.



They are an important factor in the ecology of populations, determining mortality of prey and birth of new predators. Predation is an important evolutionary force: natural selection favors more effective predators and more evasive prey. "Arms races" have been recorded in some snails, which over time become more heavily armored prey, and their predators, crabs, which over time develop more massive claws with greater crushing power. Predation is widespread and easy to observe. Neither its existence nor its importance is in doubt.



In 1970 the deer population of an island forest reserve about 518 square kilometers in size was about 2000 animals. Although the island had excellent vegetation for feeding, the food supply obviously had limits. Thus the forest management personnel 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), as predators often eliminate the weaker members of the herd. In 1971, ten wolves were flown into the island.

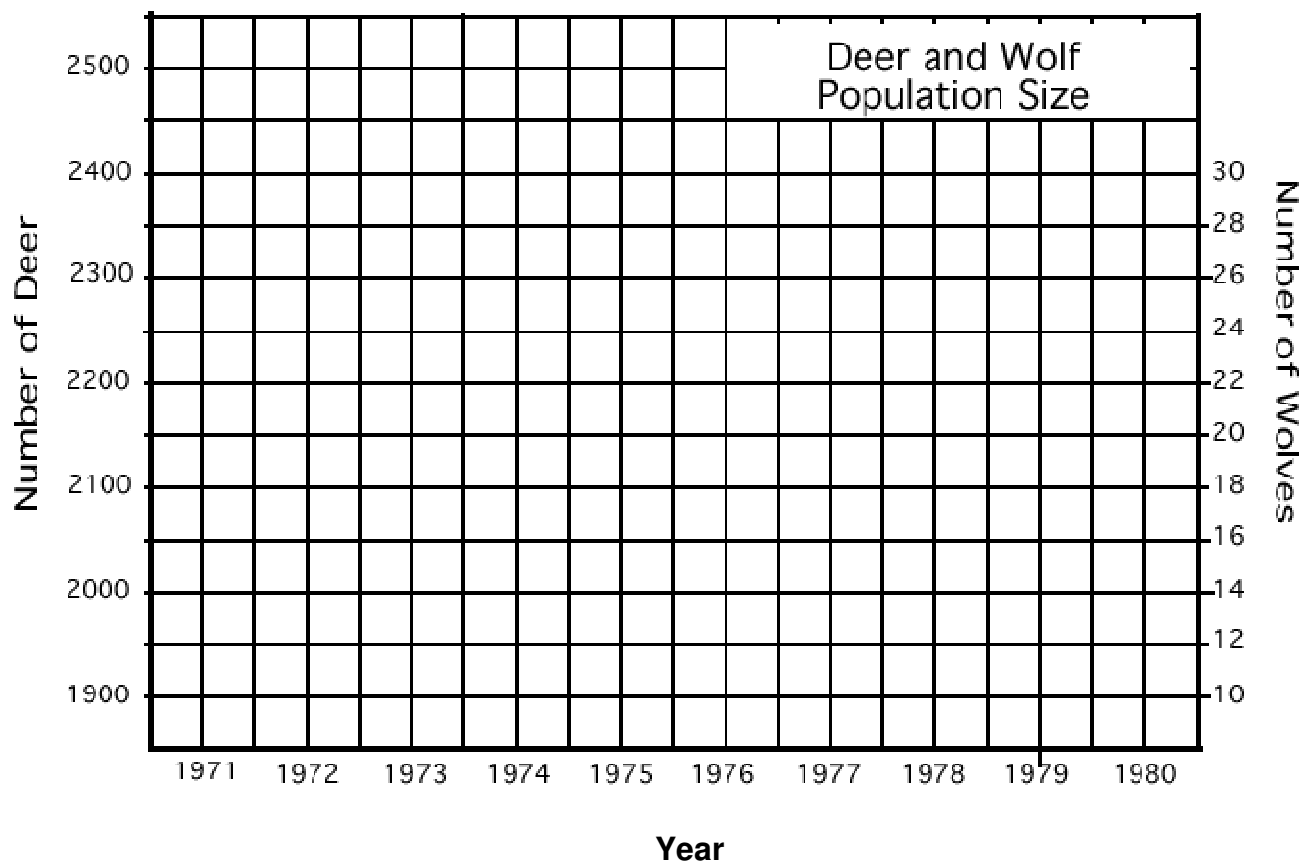
In the space below, hypothesize what you think will happen to the deer and wolf populations following the introduction of the ten wolves over the subsequent ten year period. (Be as specific as possible)

Hypothesis:

The results of this program are shown in the following table. The “Deer 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 Offspring	Predation	Starvation	Deer Population Change
1971	10	2,000	800	400	100	+300
1972	12	2,300	920	480	240	
1973	16	2,500	1,000	640	500	
1974	22	2,360	944	880	180	
1975	28	2,224	996	1,120	26	
1976	24	2,094	836	960	2	
1977	21	1,968	788	840	0	
1978	18	1,916	766	720	0	
1979	19	1,952	780	760	0	
1980	19	1,972	790	760	0	

1. Graph the **deer** and **wolf** populations on the graph below. Use one color to show deer populations and another color to show wolf populations.



Analysis and Conclusion:

1. Describe what happened to the deer and wolf populations between 1971 and 1980.

2. Was your original hypothesis correct or not?

3. What do you think would have happened to the deer on the island had wolves NOT been introduced?

4. 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?

5. In a **paragraph**, state 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.