

## **Biotic and Abiotic Influences on the Ecosystem**

Use page 52-55 of our textbook to answer the following questions.

***Tolerance range*** refers to

***Optimal range*** means

Sketch Figure 1 into the space below. Be sure to include 'tolerance range', 'optimum range,' areas of low population and areas of non population.

Distinguish between tolerance range and optimal range.

***Carrying capacity*** of an ecosystem is

## POPULATION STUDY in an ECOSYSTEM

In 1981, a study of the elk population of an island forest was begun. The island was about 3150 km<sup>2</sup> in area and had excellent vegetation for feeding, although the food supply obviously had limits. The forest managers decided to bring in natural predators to control the elk population so that overgrazing would not cause mass starvation of the herd. Elimination of the weakest elk from the herd by culling would prevent overpopulation and improve the quality of the herd. In 1985, 10 wolves were placed on the island. The results of this experiment were then studied over a 21 year period. The table below displays the results.

YEAR	elk population	wolf population
1978	3209	0
1979	3190	0
1980	3260	0
1981	3215	0
1982	3180	0
1983	3110	0
1984	3230	0
1985	2960	10
1986	2910	12
1987	2880	14
1988	2740	15
1989	2330	18
1990	2190	24
1991	2140	32
1992	1815	29
1993	1790	22
1994	1895	24
1995	2160	24
1996	2147	23
1997	2200	25
1998	2186	24

Make a point and line graph of the above data on the same graph. The horizontal axis will start at 1981 and be the same for both sets of data. The vertical axis will have two scales (one for each population) and will not be compressed or have a break. Your graph should show the population levels of both elk and wolves.

1. What is the carrying capacity for elk from 1978 to 1985?
2. What is the carrying capacity for elk by 1998?
3. Is the wolf presence on the island a limiting factor on the elk population? Explain.
4. List 4 other factors that likely control the elk population.
5. How does the size of the elk population influence the number of wolves on the island? What natural mechanisms control the wolf population?