

Activity 14

Hare Today, Gone Tomorrow

Objectives

- ◆ To develop a method of graphing a predator/prey population model
- ◆ To demonstrate an understanding of population dynamics
- ◆ To describe several factors affecting animal populations

In this activity you will

- produce a graph of the lynx and snowshoe hare populations.
- describe your method for producing the graph.
- analyze the data about the populations.

Introduction

All ecosystems have predator/prey relationships at work in them. Predators are animals that kill and eat prey. The predator and the prey depend on each other to keep their populations healthy and their gene pools strong. In fact, the Inuit people of Alaska and Northern Canada have long maintained that the wolf (predator) keeps the caribou (prey) strong by killing individuals in the caribou herd that are not as well-fit as the others. Predators and prey depend on each other so much that the population numbers of one directly affect the numbers of the other, and this results in what are called *wildlife population cycles*.

Problem

In this activity, you will examine one of the most studied and best-known predator/prey relationships in nature: the lynx and snowshoe hare cycle. After reading the information that follows, you will work with the TI-83 Plus to produce a graph that represents the population cycling of the lynx and the snowshoe hare.

The lynx is a large cat that can be found mainly in Alaska and Canada, with some still inhabiting the northern portions of the lower 48 states. It can grow to be about a meter in length, with an adult mass of 10-15 kg. Usually living 10-15 years, lynx are solitary animals that stalk and ambush their favorite prey, the snowshoe hare. Female lynx give birth to 2-3 kittens in the spring of the year, and the kittens remain with their mother for several months.

Snowshoe hares are very closely related to rabbits, and grow to be about half a meter in length and have a mass of 1-2 kg during their 2-4 year lifespan. They get their name from their huge hind feet, which can be up to 15 cm long. During the course of the year, snowshoe hares gradually change color from a summer brown to a winter white. Female hares have 2-3 litters each year, each litter consisting of 3-4 young. They are a favorite food source for several arctic predators, including the lynx.

For decades, the population cycling of the snowshoe hare and the lynx has been well documented. As long ago as the early 1800s, fur traders kept track of the populations of these two animals, and as the years passed, they started to notice a trend in the population of each. The snowshoe hare populations go through dramatic peaks and crashes, with one such cycle usually lasting 7-10 years. When the hare population is at its peak, the lynx population is on the rise, too, but the peaks and crashes in the lynx population lag behind those of the hare by a couple of years. As the lynx numbers drop, the hare numbers rebound—and on and on. If these population cycles are graphed, you can see the graph of the predator population chasing the graph of the prey population, but always staying a couple of years behind.

Your task is to figure out a way to display a graph of the populations of these two animals on your TI-83 Plus, and then describe your method of producing your graph.

Data Collection and Analysis

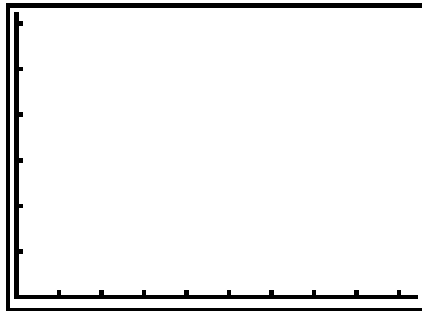
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Activity 14: Hare Today, Gone Tomorrow

Date _____

Data Analysis

1. Using your TI-83 Plus, graph the populations of the lynx and the snowshoe hare. Sketch your graph below.



Describe your method for producing the graph:

2. As the hare population increases, why does the lynx population increase?

3. Hares are *herbivores* (plant eaters), and tend to stay in the same general location throughout their lives. At the peak of their population cycle, hares can reach a population density of up to 1500 hares per square kilometer. Besides predation, describe another factor that affects the hare population.
4. How does your answer to #2 affect the lynx population?
5. In the arctic, there is a chicken-sized bird called a *ptarmigan* (pronounced TAR-muh-gun) that is also a food source for the lynx. Describe how the fluctuations in the snowshoe hare population numbers might affect the population of ptarmigan.
6. Why do the crashes in lynx numbers lag behind the crashes in hare numbers?

Teacher Notes



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Data Analysis – Answer Key

1. Student graphs and method descriptions will vary. Look for certain trends, such as a steady increase of the hare population, with an increase in the lynx population following after about a two-year period. As the hare population declines, the lynx population should also decline after about a two-year lag.

The students might want to start with the hare population twice as high as the lynx population.

2. The lynx populations increase as the hare population increases because there is more food for the lynx to eat.
3. Other factors that affect the hare population include availability of food, weather, birthrate, and so on.
4. The more hares, the more lynx can live in that area.
5. When the hare population is low, the lynx may eat more ptarmigan, thereby reducing its population. When the hare population is high, the ptarmigan population may be high as well, since lynx prefer hares to ptarmigan. Look for interrelatedness of populations.
6. It takes a while for the lynx to suffer the effects of a reduced food supply. They will start to starve and reduce their birthrate sometime after their food source declines.
7. The females are struggling to survive themselves, so their fertility declines. When a female is in a state of fighting for survival herself, she will not likely be able to support kittens.

When the lynx population declines, the hare population can start to rebound.

The females might start producing kittens again when the primary food supply (hares) becomes plentiful again.

8. Answers will vary.

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Concepts

- ◆ Predator/Prey population dynamics