

SNOWSHOE HARE & CANADA LYNX

Introductory Questions

1. What is a population?
2. What is a predator?
3. What are prey?

Read the following information about the Canada lynx and snowshoe hare.

Populations are always changing. Sometimes changes are the result of humans interfering with food webs or habitats. But even when humans do not interfere, populations will still naturally shift up and down or fluctuate. As an example, we will look closely at the relationship between the Canada lynx and its primary prey, the snowshoe hare.

The snowshoe hare is a common species of rabbit found in North America, its range extending throughout Canada, Alaska, and into the northern United States. One distinctive quality is its 2 different coloration patterns – brown in the summer, and white in the winter to better camouflage with the snow. Its diet consists of grasses, berries, twigs, bark and leaves.

The Canada lynx is a wild cat that resembles a large house cat with a short tail and prominent tufts on its ears. It is very secretive and even experienced hunters rarely see one in the wild. Its range overlaps with the snowshoe hare, on which it almost exclusively preys upon.

For over 300 years, the Hudson Bay Company has been involved in the fur trade in Canada. Detailed company records list the number of snowshoe hare pelts and the number of lynx pelts collected by hunters and trappers every year since the late 1700's. The data show a 200 year history of cyclical population booms and busts in the snowshoe hare population and a slightly delayed population boom and bust in the lynx population. Native Americans observed this cycle long before Europeans began trapping the hares and lynx for their pelts. Yet there are many competing theories to explain why the populations cycle in so dramatic a fashion.

These theories include:

- During peak years, the hares devour all the available vegetation and quite literally breed like rabbits until the environment can no longer support their blossoming population. As the hares become weakened by starvation, the lynx are better able to find and kill them, adding to their decline. The population does not reestablish itself immediately because it takes time for the vegetation to grow back.
- Another theory is that the lynx population determines the hare population. As the number of hares increases, so does the numbers of lynx that survive to eat them. Soon, there are too many lynx for the number of hares and the lynx eat away their favorite food until they too suffer a population decline until the hare population can start growing again.
- Lastly, there is evidence that at the peak population levels, the hares become so stressed by the increasing numbers of predators that they no longer reproduce at the same rate. Their population falls both as a result of the lowered reproductive success and the sheer number of lynx that are out to eat them.

4. Fill out the following table about the snowshoe hare and Canada lynx.

	snowshoe hare	Canada lynx
Appearance		
Range		
Habitat		
Diet		

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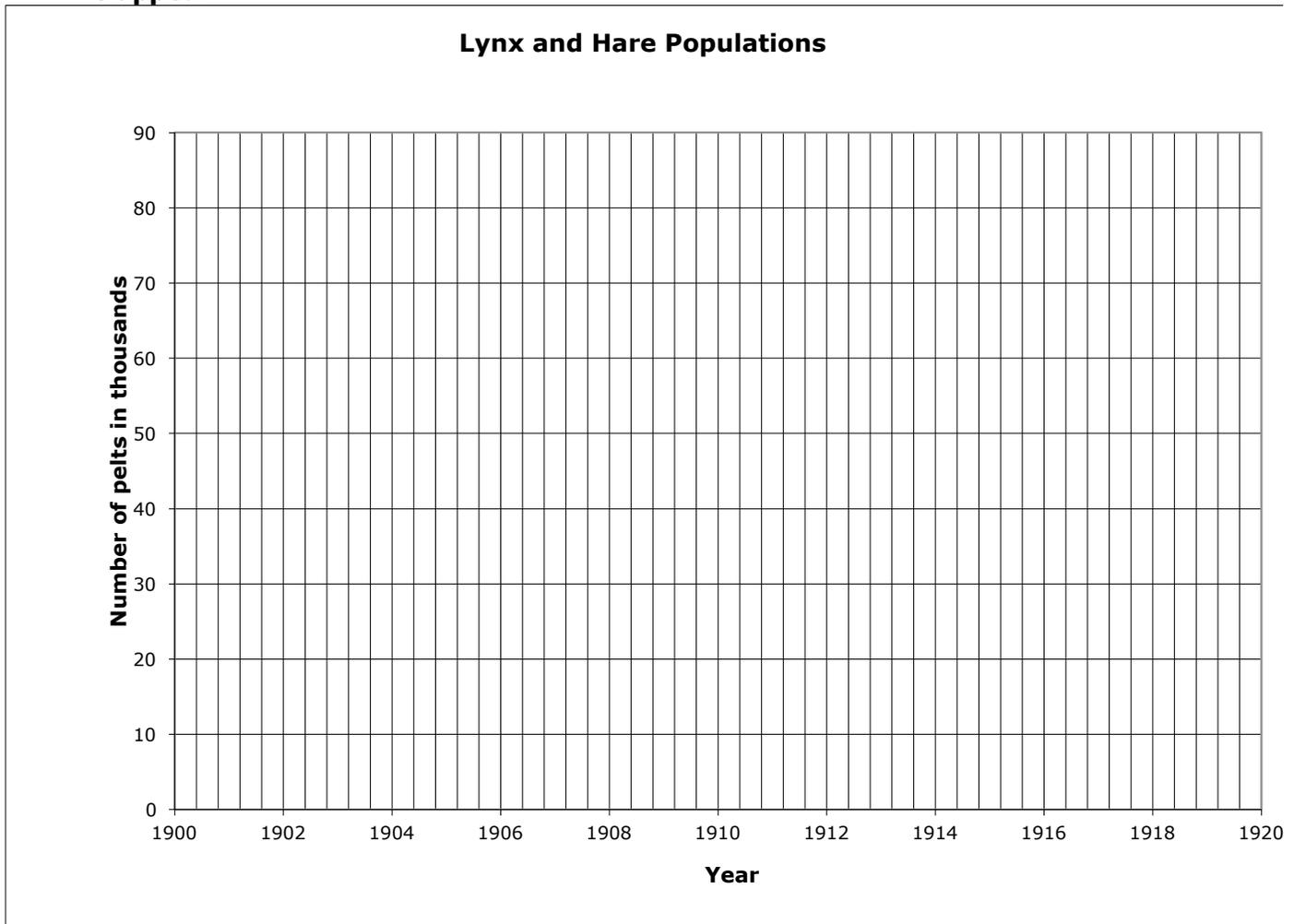
Hare and Lynx Populations

Populations are always changing. Sometimes changes are the result of humans interfering with food webs or habitats. But even when humans do not interfere, populations will still naturally shift up and down or fluctuate. For example, let us study the relationship between the Canada lynx and its primary prey, the snowshoe hare.

To understand how the population of lynx and hares changes year to year, we need to collect information about the number of individuals in a population. Unfortunately, it is impossible to count the exact number of hares in Canada in any given year. Therefore, this information must be gained by capturing a small number of individuals and then estimating the actual number out in the wild. For over 300 years, the Hudson Bay Company has been involved in the fur trade in Canada. Detailed company records list the number of snowshoe hare pelts and the number of lynx pelts collected by hunters and trappers every year since the late 1700's. A small sample of this data is presented in the table below.

Year	Hares (x1000)	Lynx(x1000)
1900	30	4
1901	47.2	6.1
1902	70.2	9.8
1903	77.4	35.2
1904	36.3	59.4
1905	20.6	41.7
1906	18.1	19
1907	21.4	13
1908	22	8.3
1909	25.4	9.1
1910	27.1	7.4
1911	40.3	8
1912	57	12.3
1913	76.6	19.5
1914	52.3	45.7
1915	19.5	51.1
1916	11.2	29.7
1917	7.6	15.8
1918	14.6	9.7
1919	16.2	10.1
1920	24.7	8.6

- 5. On the graph, use one color of pencil to graph the number of hares trapped each year between 1900 and 1920. Using another color, graph the number of lynx trapped.**



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Analysis Questions:

6. What patterns do you notice? Describe at least 3 patterns.

a)

b)

c)

Let's think about the **hares**.

Scientists observe that as the hare population gradually increases, they eat more and more grass and seeds each year until the food supply, particularly during the winter, becomes scarce. At that point, young hares have a difficult time finding enough food to survive and fewer babies are born.

7. **On your graph, label these periods of hardship with an arrow and a short description of what is happening in your own words.**

8. **As the number of hares *decreases*, what do you think happens to the population of grass and seeds that the hares eat? Why?**

9. **After a few years, the hare population begins to *increase*. Why?**

10. **On your graph, label these periods of prosperity with an arrow and a short description of what is happening in your own words.**

Now, let's think about the **lynx** which eats the snowshoe hares.

11. **In general, are there more lynx or more hares? Why?**

12. **Do the peaks in the lynx graph line up exactly with the peaks in the hares graph?**

13. **When the hare population increases, what happens to the lynx population? Why?**

14. **On your graph, label these periods of prosperity with an arrow and a short description of what is happening in your own words.**

15. **Look at 1903 and 1904. Think about what is happening to the hares at this time. Is the presence of more lynx helping the hares or hurting them? Why?**

When the hare population declines, the lynxes compensate by switching to other prey such as squirrels, gophers, mice and other rodents. However, while there are other prey around, there is not enough to support a large lynx population. When females are in poor condition, fewer will breed and not all of those bred will produce litters. Litters will be smaller, and most, if not all, of the few kittens born will die soon after birth.

16. **On your graph, label these periods of hardship with an arrow and a short description of what is happening in your own words.**

Check to see that your graph has 2 lines AND 4 arrows with labels.