Name _____ Date Conduct this experiment over ONE WEEK! March 30 – April 2 Class Science-7

LAB 2 Laboratory Activity

Changes in Predator and Prey Populations ★ project grady

A predator is an animal that kills and eats another animal. A fox is an example of a predator. The prey is the animal killed by a predator. A rabbit is an example of an animal that is prey for the fox.

The sizes of the predator and prey populations can change with time. Biologists sometimes need to know the sizes of certain predator and prey populations. They can sample the population by trapping and/or counting the animals. The result of the samplings changes as the populations change.

Strategy

You will set up a model of predator and prey populations and observe changes in the results you get from sampling as the populations change.

You will construct a graph showing your results.

Materials

101 brown beans
17 white beans
small paper bag
colored pencils

★ Note: this activity can be done with any similar items that you have at home. As long as they are 2 different colors – same size. Example Beads, buttons etc.

Procedure

Part A—Sampling a Population

1. Read this report about animals on the abandoned Linworth farm.
   The Linworth farm was abandoned in 1990, when an interstate highway was built through it. In April 1997, two biologists decided to study how the fox and rabbit populations on the 40 hectares of farmland were changing. The scientists counted rabbits by trapping and releasing them and counted foxes with binoculars. The biologists trapped and released 23 rabbits; they saw 2 foxes. The scientist continued their observations in the spring and fall for several years.
2. Put 92 brown beans and 8 white beans into a bag. The brown beans represent rabbits, and the white beans represent foxes. Note that these numbers are four times the observed number of animals in the example above. The observed animals are the sample. The larger numbers represent the numbers of rabbits and foxes in the actual populations.
3. Shake the bag with the beans. Select a bean without looking. Record your results in Table 1 in the Data and Observations section. If you picked a brown bean, put a mark under "observed" in the rabbit column. If you picked a white bean, put a mark in the fox column.
4. Return the bean to the bag. Select another bean, record the result in Table 1 and return the bean to the bag. Repeat this procedure until you have results recorded for 25 beans, which is 25 percent of the actual numbers in the populations.
5. Add together the numbers of brown beans selected. Record the number in Table 1. Repeat for the white beans.

Part B—Recording Changes in Populations

1. Examine Table 2, which explains how to change numbers of beans to show how the rabbit and fox populations changed as a result of changes in environmental factors.

Name Date March 30 Class Sci 7
April 2

Laboratory Activity 2 (continued)

2. Use the information in Table 2 and the method described in Part A to sample the populations of rabbits and foxes nine more times. Enter your data in Table 3.
   a. Start with the information for the first date in Table 2, October 1997. Add and remove beans as directed to represent the changes described.
   b. Select 25 more beans, returning them to the bag each time. Make marks in the appropriate columns in Table 3, and fill in the total number of brown beans and white beans selected.
   c. Repeat this procedure for every date in Table 3. When you come to a date in Table 3 that is not included in Table 2, assume there was no change in the populations. However, conduct a new sampling even though the total populations were unchanged.
3. Fill in the graph on the next page using the data from the population samplings that you recorded in Table 3. Use two different colored columns for each date, one for rabbits and one for foxes.

Data and Observations

Table 1

Sampling Data

Date	Rabbits (brown beans)		Foxes (white beans)	
	Observed	Total	Observed	Total
April 1997				

Table 2

Changes in Population

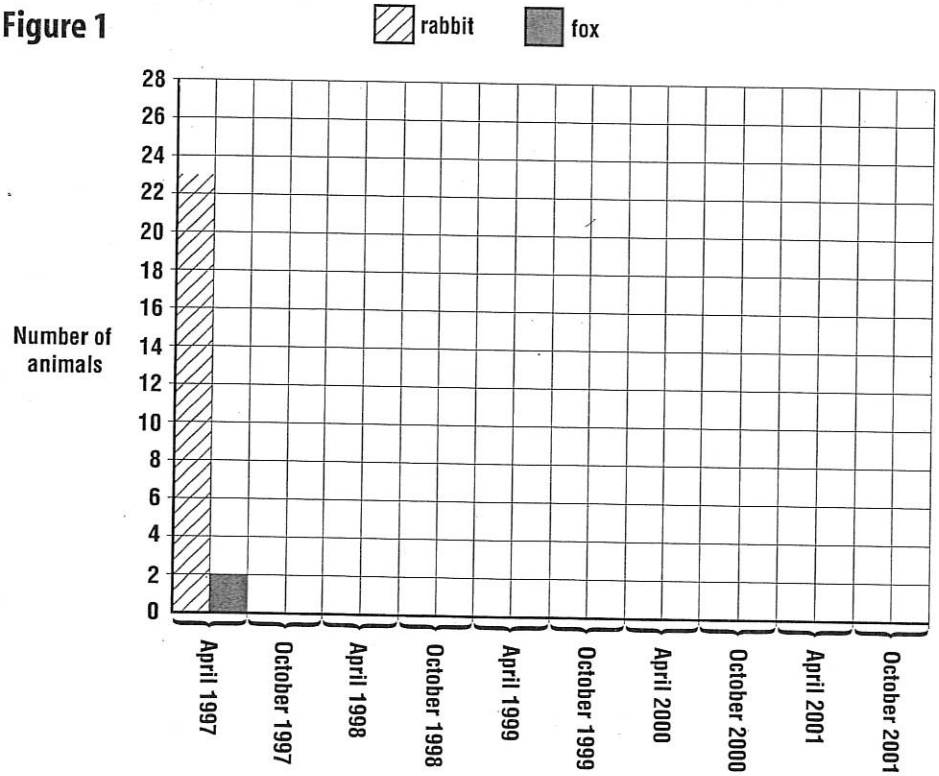
Sampling date	Rabbit population	Fox population
October 1997	The winter was harsh, and food was inadequate. Many rabbits died. Remove 10 brown beans.	Foxes ate pheasants as well as rabbits. Fox numbers increased. Add 2 white beans.
October 1998	Food was plentiful. Rabbits moved into the area. Add 15 brown beans.	Foxes had larger litters than usual. Add 2 white beans.
April 1999	Disease killed many rabbits. Remove 8 brown beans.	Food supply was low due to disease among the rabbits. Some foxes left the area. Remove 3 white beans.
October 1999	Spring came early. Rabbits could breed earlier. Add 12 brown beans.	Food was plentiful. Foxes moved into the area. Add 8 white beans.
April 2000	No change in population.	Inadequate food to feed the increased fox population. Some foxes moved out. Remove 4 white beans.
October 2000	The farm was opened to hunters, who killed pheasants. Foxes ate more rabbits. Remove 14 brown beans.	Hunters shot some foxes. Remove 2 white beans.

Laboratory Activity 2 (continued)

Table 3

Population Sampling				
Date	Rabbits (brown beans)		Foxes (white beans)	
	Observed	Total	Observed	Total
October 1997				
April 1998				
October 1998				
April 1999				
October 1999				
April 2000				
October 2000				
April 2001				
October 2001				

Figure 1



Name Date March 30 Class Sci 7

April 3 Project Grade:

Hands-On Activities

Laboratory Activity 2 (continued)

Questions and Conclusions

1. In this example, which animal is the predator and which is the prey?

2. How did the data from your sampling in Part A compare with those of the two biologists in April 1997?

3. Give two factors that caused a decrease in the rabbit population.

4. Give two factors that caused an increase in the rabbit population.

5. Give three factors that caused a decrease in the fox population.

6. Give three factors that caused an increase in the fox population.

7. What happened to the rabbits when the pheasant population decreased?

Strategy Check

_____ Can you sample populations without counting each individual?

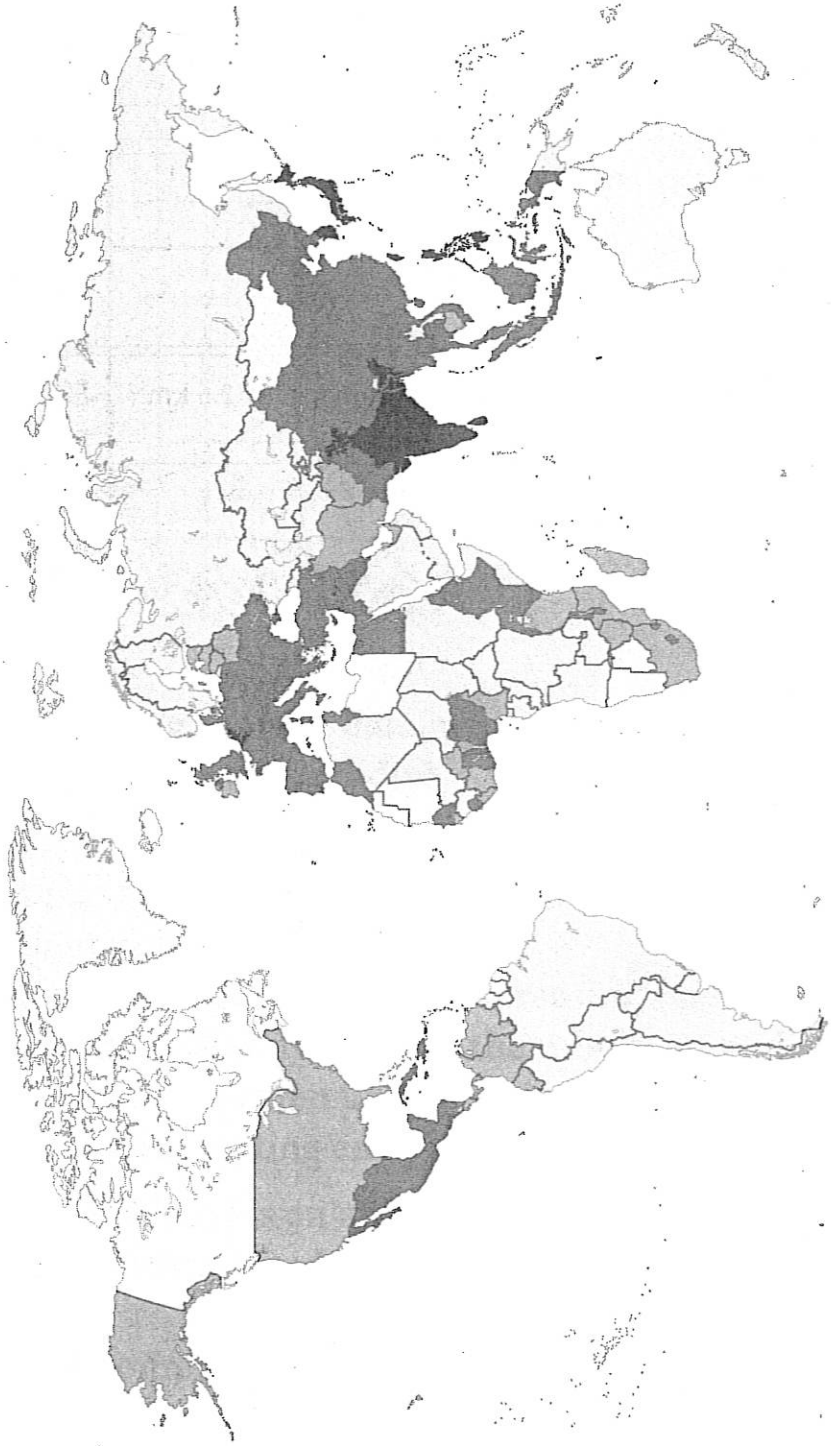
_____ Can you demonstrate that populations change over time and seasons?

Name Date April 6 Class Sci 7

SECTION 2 Teaching Transparency Activity

Population Density

* see Next Page for question



Name _____ Date April 6 Class Sci 7

Teaching Transparency Activity (continued)

- * See Map p 47-WS.

1. Name five countries that have the highest population densities.

_____

_____

_____

2. What is the range of humans per 2.6 km^2 in the United States?

_____

3. Which continent has under ten humans per 2.6 km^2?

_____

4. The majority of South America has how many humans per 2.6 km^2?

_____

5. What bordering country of the United States has under ten humans per 2.6 km^2?

_____

Name _____ Date April 7 Class Sci 7

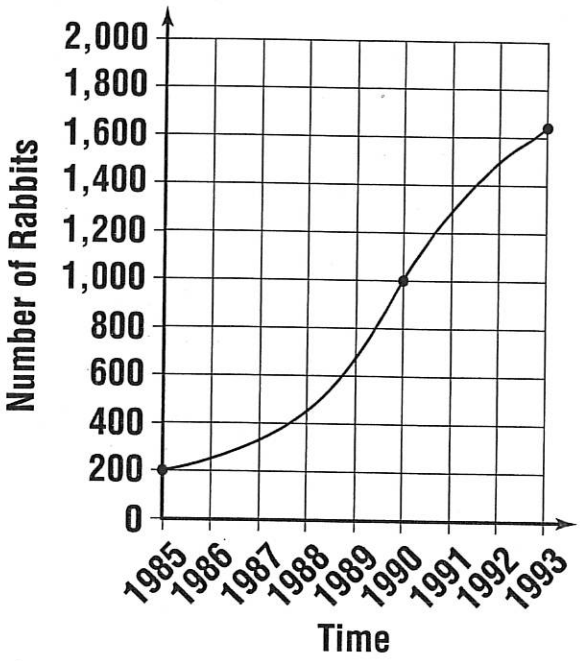
Assessment Transparency Activity

Interactions of Life

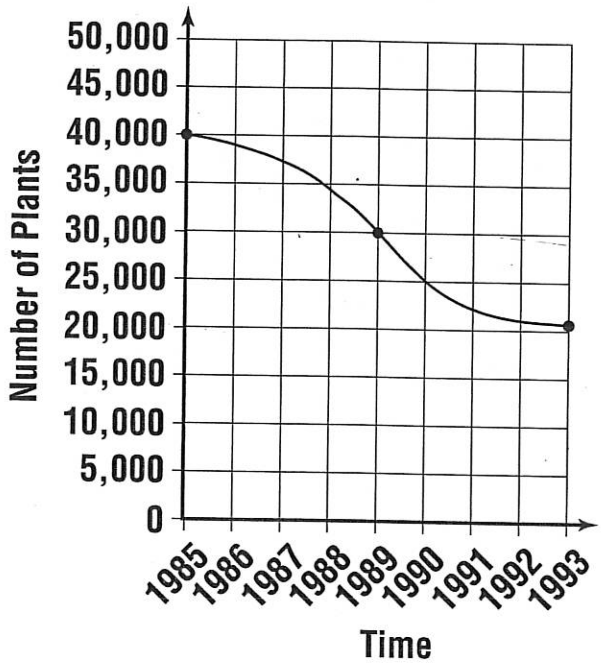
* April 8 – April 13 Easter

Directions: *Carefully review the graphs and table and answer the following questions.*

Rabbit Population 1985–1993



Plant Population 1985–1993



1. According to these data, which year was the rabbit population increasing most rapidly?
   A 1985 B 1986 C 1990 D 1993

2. A reasonable explanation based on these data is that in 1990 the plant population ___.
   F was being eaten by the increasing rabbit population
   G was increasing because the rabbits were disappearing
   H was being eaten until it was extinct
   J was not getting enough sunlight

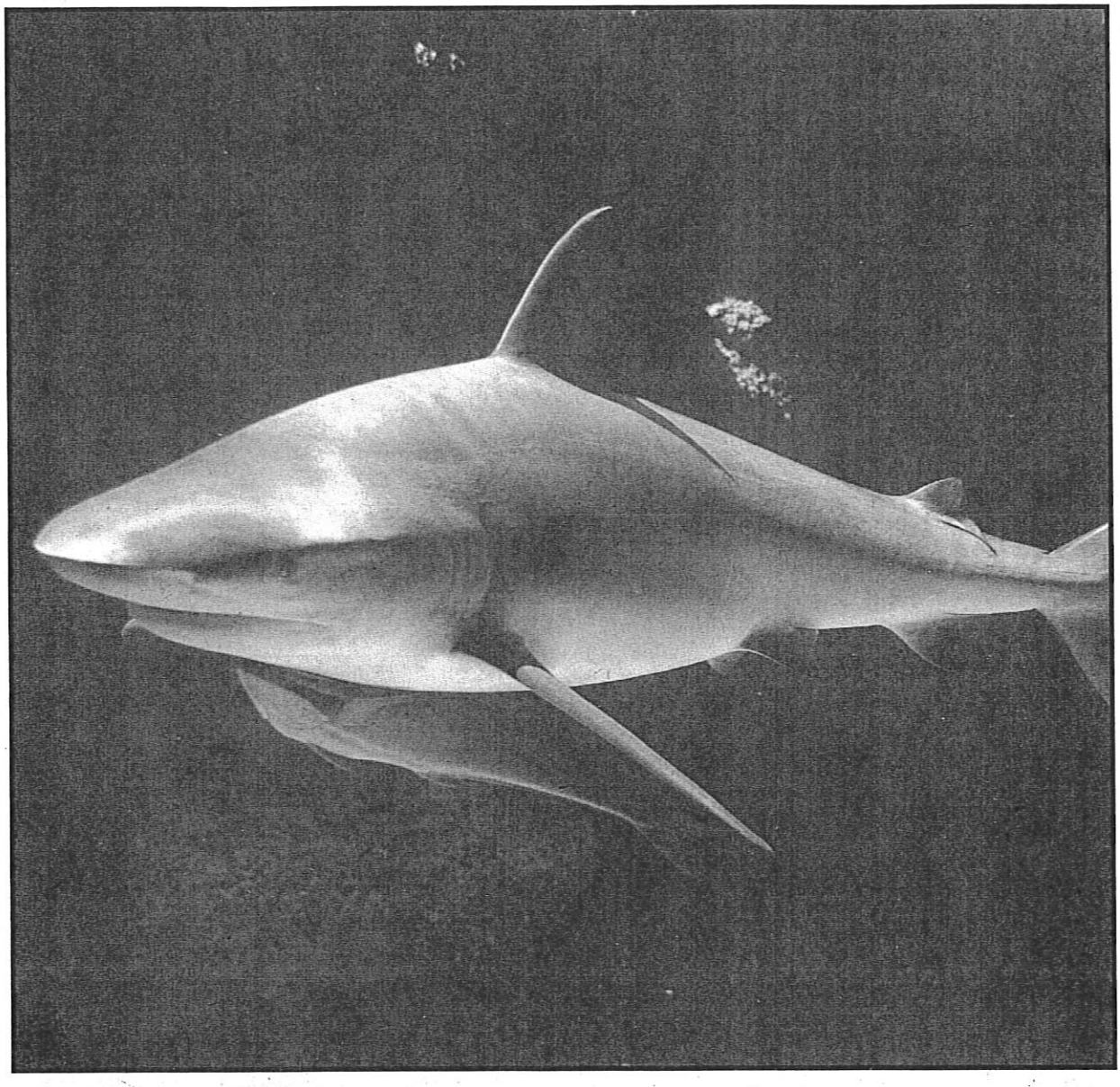
3. An herbivore is an animal that only eats plants. A reasonable explanation based on these data is that if an herbivore population increases, then the ___.
   A decomposer population will decrease
   B plant population will decrease
   C carnivore (animal-eater) population will decrease
   D plant population will increase

Name Date April 14 Class Sci 7

SECTION 3 Section Focus Transparency Activity

Frolics with Sharks

Remoras are several different species of related fishes that attach themselves to sharks and other ocean organisms. Both the shark and the remora benefit from this relationship.



1. Why doesn't the shark eat the remora?
2. How do the shark and remora help each other?

Name Date April 15 Class Sci 7

SECTION 2 Enrichment

Tracking Animals for Research

Many animals migrate throughout their lives in search of food, mates, and suitable climates. When animals are constantly on the move, how can researchers possibly keep track of them to learn more about the habits of those creatures? Researchers do this by *tagging*. Tagging involves different types of devices, from bands to darts to electronic transmitters, that allow researchers to learn about animal behavior. First, scientists catch and tag the animals. On the tag they write the date, location, and various biological information. Then they release the animals. At a later date, they must capture the animals again so that the information on the tag can be recorded. Animals that are tagged electronically do not have to be recaptured for researchers to gain information about them. When properly used, tags can tell researchers about where animals travel, what they eat, how long they live, and their birth and death rates.

Playing Tag

Tags have been used to track many different types of animals, including birds, sharks, sea turtles, and even monarch butterflies. In each case, the tags must be suited to the physical size and activities of the animals. Poorly designed or applied tags can harm animals, or even cause them to die, and can fail to give researchers the information they seek. In the case of birds, leg bands have been used for around 80 years.

For sharks, researchers use tags that vary in size depending on the shark species, but usually involve a dart or similar object that is attached to a cord several inches long. Recently, endangered green sea turtles in the Gulf of Mexico were equipped with satellite transmitters. Researchers there hope to discover information about the migratory movements and other behaviors of the turtles in an effort to prevent them from becoming extinct.

Stick-on Tags

In working with a more delicate species, Dr. Fred Urquhart spent 20 years developing tags suitable for tracking monarch butterflies, which had disappeared from the Northern United States and Canada. The tags he designed were lightweight adhesive wingtags that are just large enough to carry an identification number and a mailing address to send information. With the help of many volunteers, Dr. Urquhart was able to discern that the monarchs seemed to be heading for Mexico.

Tagging can be dangerous for animals, and proper training is required for each project. Some states have laws that govern or even prohibit certain types of tagging. Those who wish to serve as volunteer taggers for a specific research project should contact the sponsoring research institution for information and training on proper tagging for the particular species and research project.

1. Why do researchers tag animals?

2. What are some of the different types of tags that are used?

3. Why might tags be harmful to animals?

Name Date April 16 Class Sci 7

SECTION 1 Enrichment

Tropical Rain Forests

There is a climactic region on Earth that covers only 2 percent of its surface yet supports more than half of its plant and animal life. This region is the tropical rain forest. Although different types of rain forests exist in different climates, tropical rain forests receive four to eight meters of rain each year and are located in hot, humid climates near the equator in Africa, South and Central America, and Asia.

World's Largest Habitat

The world's largest habitat of plant and animal life is the Amazon rain forest in South America. It spreads across 40 percent of the total area of Brazil, covering an area of 6,000,000 square kilometers. Millions of species of plants, insects, birds and other life forms, including jaguars, manatees, red deer, and monkeys, live in this region. Many of the species in the region have never been recorded or studied. Of those plant species that have been documented by scientists, many have proved to be very beneficial to humans. A significant percentage of modern medicines come from plants that grow in tropical rain forest regions. Rain forests are also important because they recycle water, oxygen, and carbon.

Shrinking Forest

The humidity, heat, and heavy rainfall of the region create lush vegetation. The trees have broad leaves that form an upper canopy high above the forest floor. Trees that grow in the rain forest include species of myrtle, laurel, palm, rosewood, mahogany, and cedar, to name just a few. Because of the value of mahogany and cedar as lumber, the need for farmland, and the growing population in Brazil, the Amazon rain forest has shrunk drastically in recent decades. Since the 1990s parts of the Amazon rain forest have been protected from further destruction. In other parts of the world, the battle between those who want to protect the rain forest and those who want to exploit its resources continues.

1. Where are tropical rain forests located?

2. Why do you think rain-forest trees have broad leaves found high above the forest floor?

3. Do you think rain forests should be protected or should they be used for their resources? Explain.

4. Why has the Amazon rain forest shrunk in recent years?

Meeting Individual Needs

Name _____ Grade 7 Science Movie

*Friday's are Science movie day. Select an appropriate science movie

Related to the assignment that is posted to Morris homework site.

Record the web address of the movie. Watch video and write a response.

1. What did you find most interesting about the movie; be specific.
2. Explain one new thing that you learned from the movie that is related to the science topic being studied.

Friday April 17 Topic: Predator and prey populations in an ecosystem of your choice

Friday April 24 Topic: Tracking animals for scientific research

Friday May 1 Topic: Cardiovascular system –How does it work?