PRELIMINARY ACTIVITY FOR

Modeling Population Dynamics

Open Inquiry Version

The most basic definition of ecology is the study of population in nature. The most general attribute that a population has is its size, consequently this is the focus of many ecological models.

In this Preliminary Activity, you will use a spreadsheet to model a simple exponential growth for one species. You will then explore the effects of carrying capacity, competition, and predators on population dynamics.

After completing the Preliminary Activity, you will first use reference sources to find out more about population dynamics before you choose and investigate a researchable question. Some topics to consider in your reference search are:

- populations
- communities
- herbivores

- predators
- population dynamics
- carrying capacity

Later, you will use the class research results as you investigate the population dynamics models of various combinations of competing herbivore species and predator species.

PROCEDURE

Part A Simple Exponential Growth

1. Open the Population Growth Model spreadsheet file.

2. On the Simple Exponential Growth sheet, examine the graph for a population when the growth rate is 5% and the starting population is 20.

3. Experiment with different growth rate and starting population values.

4. Answer the Part A Questions prior to moving on to Part B.

Part B Population Growth Considering Carrying Capacity

5. On the Carrying Capacity sheet, examine the graph for a population when the growth rate is 5%, the starting population is 20, and the carrying capacity is 100.

6. Experiment with various values for growth rate, carrying capacity, and starting population.

7. Answer the Part B Questions prior to moving on to Part C.

Part C Population Growth with Competition

8. On the Competition sheet, examine the graph for two herbivores competing in the same environment.

9. Experiment with various values for growth rates, carrying capacities, and starting populations.

10. Answer the Part C Questions prior to moving on to Part D.

Part D Population Growth with a Predator

11. On the Predator sheet, examine the graph for two herbivores and a predator.

12. Experiment by changing the values of the constants and starting populations. Answer the Part D questions when you are finished.

QUESTIONS

Part A

1. Describe what happens to the shape of the graph if the growth rate is increased.

2. Why is an exponential population growth model considered unrealistic?

Part B

3. Describe what happens to the shape of the graph if the carrying capacity is increased.

4. Why is this population growth model also considered unrealistic?

Part C

5. What factors determine an organism's impact?

Part D

6. Would a larger rate of successful kills per encounter mean that the herbivore was better or worse at escaping predators?

7. Would a smaller, shorter-lived organism have a larger growth rate? Smaller impact? Larger rate of successful kills per encounter?

8. List at least one researchable question for this investigation.