How Many Squirrels Can the EGHS Courtyard Support?

Chapter 7: Species Interaction, Ecological Succession, and Population Control

Introduction

Gray squirrels living in oak forests often use acorns as their major—or even sole—source of food. Oak forests are quite common in the eastern United States. Sometimes they are natural. Other times they have been planted by humans in parks, campuses, or cemeteries. By determining the size and species of the oak trees and calculating the energy present in their average annual production of acorns, you can determine the theoretical carrying capacity of the area for squirrels.

Table 1: Team Data Table (each team has a different species of tree)

Team Number:		Species:		
Tree Circumference	Tree Diameter (C/ π)	Number of Trees	Kilograms of acorns per tree (refer to table 2)	Total Kilocalories
			Total kg of all trees:	

Step 1. Measure the diameter of each tree. Record the number of trees of each diameter in Table I.

Step 2. Consult Table 2 to determine the average annual acorn production of each tree. Transfer this information to Table 1. Complete Table I by calculating the total annual acorn production for all your trees.

Table 2: Yearly Ave	erage Acorn Product	ion in Kilograms foi	Various Oaks
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Diameter Of					
Tree(cm)	Black Oak	Chestnut Oak	Northern Red Oak	Scarlet Oak	White Oak
25	0.50	0.40	0.18	1.10	0.85
30	0.77	1.40	0.99	1.80	1.60
35	1.0	2.30	2.60	2.50	2.30
40	1.30	2.70	4.50	4.60	3.10
45	1.50	3.60	6.50	5.40	3.90
50	1.80	4.0	7.10	6.60	4.60
55	2.10	4.40	7.70	7.90	5.40
60	2.30	4.50	6.90	8.0	6.10
65	2.60	4.70	6.20	8.20	6.80
70	2.90	4.90	5.60	8.40	7.50
75	3.20	5.10	4.80	8.60	8.20

Step 3. Convert the calculated total acorn yield in kilograms to kilocalories. One kilogram of acorns produces approximately 4,500 kcal. Therefore, you should multiply the total number of kilograms you obtained in Step 2 by **4,500**.

Step 4. Relate the number of kilocalories to the population of gray squirrels. Researchers have determined that a 0.5 kg squirrel requires 137 kcal each day for maintenance in the laboratory. Therefore, to find the number of squirrels your oak forest can support in a year, use the following formula:

<u>total number of kilocalories</u> = number of squirrels/year 137 kcal/squirreb'day x 365 days

Team Number	Species	Number of Trees	Carrying Capacity of Squirrels
1			
2			
3			
4			
5			
		TOTAL of all TREES	

Table 3. A Chart for Combining Class Data

Questions

I. What is the total carrying capacity of squirrels in the EGHS courtyard?

2. Do you think the actual carrying capacity was more or less than your calculations? Why or why not?

3. Which species of tree provided the greatest carrying capacity? Why do you think that is?

4. Squirrels are conscience of the type of acorns they eat? Explain why

5. As much as 25% to 50% of the diet of the black bear, raccoon, white-tailed deer, and wild turkey is made up of acorns. What would happen to the carrying capacity of your plot if any of these animals were present?