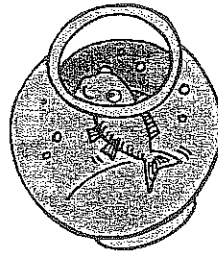


Population Ecology Lab - Determining the Number of Goldfish in a Pond



Pre-Lab Discussion

Biologists often have to determine the total number of organisms in a large area. If the organisms in the population being studied do not move around, a quadrant census technique can successfully provide an estimate of population size. Another technique must be used with populations such as the fish in a lake. This technique is called the "mark & recapture" method.

Purpose

Estimate population size using the mark & recapture technique

Materials (per group)

Bag of Goldfish crackers	1 medicine measuring cup
1 gallon zip lock bag	marker pen (any color)

Procedure:

1. Obtain a population of goldfish in a pond (You may recognize that these are goldfish crackers in a gallon zip lock bag. A good model of an aquatic ecosystem.)
2. Make sure your population of goldfish is well mixed.
3. Notice that a 0 is present in Column A of Sample 1 to indicate that there are no marked goldfish present in the population before you start your study.
4. Remove a sample of goldfish from your pond with a medicine measuring cup. Make sure the medicine cup is filled to the top with fish. Record the number of goldfish in your sample in column B.
5. Use a marker pen to make a mark on the body of each of the goldfish in your sample. Now you have "marked" the first members of your population indicating that they have been captured!
6. Record the number of goldfish you marked in Column D and return your marked goldfish to the population.
7. In Column A record the total number of marked goldfish that are now present in your population.

8. Mix your population of goldfish and withdraw another medicine measuring cup full.
 - a. Record the total number of goldfish in this sample (both marked and unmarked) in Column B
 - b. Also record how many marked goldfish you have "recaptured" in Column C, and how many goldfish were captured for the first time in Column D.
9. Mark each unmarked goldfish in this sample with the marker. Return all the marked fish to the population.
10. In Column A record the total number of marked goldfish that are now present in your population (the sum of all the goldfish you have marked so far).
11. Repeat this procedure. Fill in the data table.
12. For the last 4 samples use the following equation to calculate the total population size.

$$\frac{\text{\# marked goldfish in sample (C)}}{\text{\# total goldfish in sample (B)}} = \frac{\text{total \# marked goldfish in population (A)}}{\text{total number of goldfish in population (E)}}$$

Remember that the total number of marked goldfish in the population will increase each time you take a sample and return more marked goldfish to the population.

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Sample	Column A # of marked goldfish in starting population	Column B # of goldfish in sample	Column C # marked goldfish in sample	Column D # goldfish we mark and return to population	Column E Population Estimate
1	0				
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Average the population estimates for the last 4 samples. This is the estimated population size. _____

Now count your population and see how closely the estimated number of goldfish agrees with the actual number of goldfish. Actual number _____

Calculate the percent error your estimates had. ESTIMATE population size minus ACTUAL population size. Divide that value by the ACTUAL population size. Multiply by 100: _____