

Catch Me If You Can?

Overview

Students use the capture-recapture technique for estimating populations. This method is frequently used to monitor animals and fish populations. The lima beans will represent frogs and the bowl will represent the wetland.



Title

Catch Me If You Can?

Investigative question

What is the current frog population of a wetland?

Overview

Students use the capture-recapture technique for estimating populations. This method is frequently used to monitor animals and fish populations. The lima beans will represent frogs and the bowl will represent the wetland.

Objective

Students will estimate the total number of “frogs” in the wetland bowl habitat through sampling by the capture-recapture method.

Materials

Per group of 2 or 3: small bowl with dry lima beans, marker, data sheet, calculator.

Time

One 50-minute class period

Advance Preparation

Assemble needed materials and fill small bowls with 2-3 handfuls of dried lima beans

Introducing the Activity

Tell students that they do not have to capture "all" the animals in a habitat to know how many are actually living there. Stress that this is a simulation of a method that scientists use to estimate populations of real organisms (animals).

Procedure

1. Distribute a bowl of beans to each group.
2. Students “capture” a small handful of “frogs” from the wetland habitat and count the number of “frogs” selected. Students mark each “frog” on the front and back with an X. These will represent the captured or marked “frogs”.
3. Return the frogs to the wetland and mix them in well with the other “frogs”.
4. “Capture” another small handful of frogs from the wetland habitat. This will be your first capture trial—trying to recapture marked “frogs”. Count the number of “frogs” in the handful. This represents the number of “frogs” captured. Count the number of marked “frogs” with an X. This represents the number of marked “frogs” recaptured.
5. Use the proportion shown on Student Page 1 to estimate the total number of “frogs” in the wetland habitat.
6. Return the “frogs” to the wetland.
7. Repeat this process nine more times.
8. Record all data on the student page.

Assessing the Activity

1. Estimate the population (P) of your wetland
2. Do you think the population could be greater than any of your estimates?
3. Count the total number of beans in the bowl. How does the actual count compare with your estimates?
4. Why is it important to return the “frogs” to the bowl and mix each time you repeat the counting?
5. Why is it a good idea to base an estimate on several samples rather than just one sample?
6. What would happen to your estimate if some of the X’s wore off?
7. How could something like this happen with frogs?

Extending the Activity

Have students try to think up real world situations where they could use this mark/recapture method. If any are feasible, have students attempt to use this method to estimate a population of organisms.

State Goals

11, 12

Concept

While it is seldom feasible to count all the organisms in a given area, it is possible to estimate population sizes by a number of methods. One of these is to capture a certain proportion of the population, mark it, release it back into the population, and then recapture a portion of the population. By calculating what proportions of the second captures are marked (recaptures), the population size can be estimated.

Safety and Waste Disposal

None required.

Student Page 1

Proportion needed:

Original Number Marked Frogs (A) = Marked Frogs That Are Recaptured (R)

Total Population In Bowl (P) Total Frogs Captured in a Handful (C)

(Note: P is the unknown you are trying to find.)

$$\frac{20}{P} = \frac{6}{30} \quad 6P = 600$$

$$P = 100 \text{ frogs}$$

Original number of captured frogs _____(A)

Capture Trial Number	Frogs Captured in a handful (C)	Frogs Marked that are Recaptured (R)	Population Proportion (P)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Average Population _____

Total number “frogs” in the wetland _____