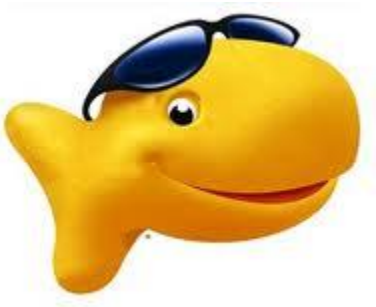
Lab: Mark & Recapture

Background Information: How do biologists determine the population of a species in a particular area? There are a variety of ways that it can be done, however the most common method involves tagging. In this method, biologists first capture and tag a sample of the animals. Then, after some time has passed for the animals to "redistribute" themselves, the scientists take repeated random samples and calculate the percentage of each sample that is tagged. We would expect that these example percentages should vary around the true population percentage. Using this assumption, one can calculate the approximate population size given that they know the original number tagged and the mean percent tagged from the samples.



Prelab Questions:

1. What concerns should biologists have about a species and their habitat before they use the mark & recapture method to approximate the size of a population?
2. Which of the following examples do you think reflects the largest population? Which reflects the smallest? Explain your answer.
    a. Large first sample, large second sample, large recapture
    b. Large first sample, large second sample, small recapture
    c. Small first sample, large second sample, large recapture
    d. Small first sample, small second sample, large recapture
3. Imagine that you are studying birds that are flying south for the winter. How might their migration affect the results of a mark-recapture study? Can you accurately estimate the migrating bird population using the mark-recapture method? Explain your answer.
4. Name three marine species that migrate large distances.

Procedures:

A. Estimate the total number of goldfish simply be looking at them - _____
B. Remove a sample (a large handful of goldfish). Replace this sample with the equivalent number of tagged fish (pretzel goldfish). Record how many you "tagged." The pretzel fish represent the original fish that are now tagged.
C. Mix the population thoroughly to get the tagged fish "redistributed" among the population.
D. Without looking (to prevent your personal bias) remove a sample of fish. Count the number of tagged and total number of fish in your sample, recording these numbers. Also calculate the percent tagged in the sample, using two decimal places for accuracy. <u>After counting, put these fish back in with the rest of the population</u>.
E. Mix the population thoroughly and repeat the sampling for a total of 20 samples. The sample sizes do not have to remain the same, but you do want to get fairly large handfuls of fish each time. All fish always go back after counting.
F. When you are finished, find the average percent tagged for the 20 samples.
G. Share your data with other groups and record their data in the class data chart.

Results:

Sample #	# of Tagged Fish in Sample	Total Sample Size	Percent Tagged in Sample
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
Average Percentage Tagged =			

Number of fish originally tagged: _____

Population size = $\frac{number\ originally\ tagged}{mean\ percent\ tagged\ from\ the\ 20\ samples}$

Using the formula above, find the predicted size of your population: _____

Now, count your entire population and determine the actual population size: _____

Number your estimation was in error: _____

Class Data:

Group	Average Visual Estimate	Average Mathe-matical Estimate	Actual Popula-tion Size	Error
1				
2				
3				
4				
5				
6				
7				
8				
9				
AVG				

Postlab Questions:

5. How does the sample size of each capture affect results?
6. How does the number of samples affect results?
7. How would the actual size of the population affect the ability to estimate its size? (are larger or smaller populations easier to estimate?)
8. In this experiment, why do you feel your estimate was different than the actual population size?
9. How might this error be minimized in future experiments?
10. Since we are unable to magically transform fish into pretzels, how might fish be tagged in real life?