Engage: How Many Frogs?
(A Thousand Frogs and Not a Single Prince!)

PROCESS AND PROCEDURES

It is important sometimes to know how many of a certain type of plant or animal live in a certain area. This can be tough to do accurately for a number of reasons which we will discuss in class. In this activity, you will be given one method that is used by scientists in real life to try and estimate the size of a population of animals in a given area. It is sometimes referred to as "Tag and Release" or "Capture and Recapture".

Make two tables in your notebook that looks like this:

Trial #	# marked beans in sample	total # beans in sample	ratio of marked to sample total	calculated total beans in container
1				
2				
3				
4				
5				

1. (a & b) You will be given a "lake" (container) full of "frogs" (beans). Record the name of your lake in your notebook and write down how many frogs you think are in your lake for 1a. Later you'll do the same for a second lake under 1b. Also, put the name of your lake over the table in your notebook.

2. (a & b) If your frogs have not been "tagged" by a previous scientist, then take out a good handful of frogs and use a Sharpie to mark both sides of each frog you pulled out. Record the name of the lake and the number of frogs you tagged in your lab notebook (2a), and return them to their pond. Be sure to let the frogs mix back into the lake (put the lid on and mix the beans!).

   If your frogs have been "tagged" by a scientist already, pour all your beans out, separate the marked and unmarked frogs, put the unmarked frogs back in the lake, and record how many total frogs are marked in your lab notebook (2a) before returning those to the lake as well. Be sure to let the frogs mix back into the lake (put the lid on and mix the beans!).

   Later you'll repeat #2 for a second lake and record the info under 2b.

After your frogs have had time to mix around the lake well, pull out a handful of frogs. Record in the first table how many frogs you pulled out in your sample and how many of those were marked. When you're finished, return the frogs you pulled out back to the lake and let the frogs mix again. Repeat this process for five samples (as shown in your table).

After you are finished recording samples from one lake, trade with another scientist and repeat the process for a second lake.

PROCESS AND PROCEDURES (cont.)

To calculate the ratio of marked beans in a sample to the total sample (fourth column in the table) , simply divide the number of marked beans you had in a given sample by the total number of beans in that sample. To calculate the total number of beans in the bag (fifth column in the table), divide the total # of marked organisms that were originally released (from question #2 above) by the ratio you just found in the table. Do this for each of the five samples in both of the tables.

ANALYSIS

Answer the following questions in your notebook using complete sentences.

1. What was the name of your first lake? How many frogs did you guess were in the lake?

2. Average your five calculated population values from your table. How close was your "guess" to the average value? How does your average value compare to the average found by the other scientists who sampled your lake?

3. Can you think of some types of animals where this type of model/activity may not be a good indicator of what the real population of that animal is? Explain what the problem is with this model for your animal. Why wouldn't it be a good population estimate?

4. If frogs were leaving the lake or dying after you tagged the initial group and other frogs were entering the lake or being born before you did your sampling, would your calculated estimate of the population be too high or too low? Explain.

5. If the frogs don't "mix" in the lake (some frogs hang out in some areas, some hang out in other areas), how could that affect your calculation of the population? Explain.

6. If the lake your frogs lived in was 2.5 acres in size, what would be the population density of the frogs in your first lake (use the average population you found in question #2 above)? Would you expect the population density of flies at this lake to be higher or lower than the population density of frogs? Explain your answer.