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Population Dynamics

Activity Instructions

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Here are two very inexpensive easy activities that demonstrate two different ways of making a population assessment. Both of these activities pertain to goal two.

Population Density
This refers to the number of a certain species per unit area. For example, 15 maple trees per acre. This is most commonly used when talking about vegetation (most animals have the ability to move out of an area). However, it is used at times to describe animal populations. The most obvious example of this is people per square mile; it is also used when referring to deer populations a lot. For our purpose will we will look at some plants.

The best place to do this activity is a large open field that has vegetation on it. Divide the students into groups, have each group go to a randomly selected area of the field. Have each group lay out a one square meter plot. Use string to mark the square. Now identify some sort of vegetation that will be easy to count within these plots. Have the students count how many of these plants occur within their plots. While the students are counting the plants try to measure the size of the field that you are working in, you could have a couple of students do this.

Once the students have counted the plants, have them find the average number of plants per meter square. Now give them the measurements of the field and have them estimate the total number of those plants in the field. Once they have found the total discuss how they used population density to determine the size of a population.

Capture Recapture
Trying to determine the population size of an animal that moves around is quite a bit more difficult than just going out and counting all of them. That is where this population assessment method helps. Capture Recapture is simply that, going out and capturing as many individuals as possible making them recognizable in some way and then going back after a certain amount of time and capturing again, counting how many recaptures you got. Some of the ways animals are made recognizable are; tags, paint on birds, and clipping fins on fish.

For this activity we will be estimating the population of beans in a container. Preparation for this activity requires a lot of bean counting. Get several identical containers to put beans in; one for each group. Pick a number between 375 and 450 and put that many beans into each container.

When you start the activity with the students have them just look at the container and try to guess the number of beans. Write down a few numbers so that they can see how close/far they were from the real population size; explain why population assessment methods are needed, because just guessing is not very accurate. Have the students "sample" the population and take 75 beans out of their containers. Now have the students put some sort of mark on each of the 75 beans. Permanent marker works well, but make

sure that you allow the ink to dry. Have the students "release" their beans by putting them back into the container. Now have the population move around, shake 'em up. Have the students sample the population again, this time taking a random handful of the beans out of the container. Have them count how many beans are in their handful and of this number how many have marks on them. Now plug the numbers into the equation:

N (population estimate) = (Marked in the first sample (75) x Total number captured in the second sample) / Number in the second sample that have marks

$$N = (M \times C) / R$$

Have the students calculate their population estimates and the class average, were they close to the actual number (hopefully). Discuss why/ why not. You could have the students run the recapture portion a couple more times. What happens to the class average? It should get closer to the actual value.