

# Lake Holattawatta

Taking sample data and making predictions.

## SCENARIO

You are a fish and game warden for Lake Holattawatta. One of your jobs is to estimate the number of fish in the lake. The last warden, Laree Lamo, lost his job because he couldn't do it right. At first, he tried to swim among the fish with scuba gear and count them all. He kept losing track and would have to start over. In his frustration, he gave up and reported to the state Fish and Game Department that Holattawatta had a holattafish. Needless to say, the Fish and Game Department fired him and hired you.

You were granted the job because of your mathematical skills in sampling data. You intend to net several samples of fish, tag the fish and release them back into the lake. After an adequate amount of time, you will net several samples again. The ratio of tagged fish to untagged in your sample will give you an idea of how many fish are in the lake. This gives you valuable information on stocks, migration and predation. In this activity, we will use tag-and-release to estimate the number of "fish" in Lake Holattawatta.

## MATERIALS NEEDED:

1 brown bag (lake hollatawatta)

1 bag of dark beans (fish in the lake)

1 bag of light beans (tagged fish used in release)

Small cup (net)

## PROCEDURE:

Step 1 Pour the dark fish into the lake.

Step 2 Reach into the lake and remove a net of fish to tag. Count and record the number of fish you removed. Replace these fish (dark beans) with an equal number of tagged fish (light beans). Return the tagged fish to the lake. Set aside the extra beans.

Step 3 Allow the fish to mingle (close the bag and shake it lightly). Again remove a net of fish, count them all, and count the number of tagged fish. Record those counts and ratio of tagged fish to total fish in the sample.

*You have taken one sample by randomly capturing some of the fish. You could use this sample to estimate the number of fish in the lake, but by taking several samples, you will get a better idea of the ratio of tagged fish to fish in the lake. Replace the fish, mix them and repeat the sampling process four more times, filling in a row of your table each time.*

Step 4 Choose one ratio to represent the five ratios. Explain how you decided this was a representative ratio.

Step 5 If you mixed the fish well, should the fraction of tagged fish in a sample be nearly the same as the fraction of tagged fish in the whole lake? Why or Why not?

Step 6 Using the ratio you chose in Step 4, write and solve a proportion to find the number of fish in the lake (About how many beans are in the bag?) Why is this method called capture-recapture? How accurate are predictions using this method? Why?

Step 7 Count the number of fish in the lake to check for accuracy. Record your answer.

Step 8 Separate all the fish into dark and light bags.

Step 9 Return lab materials to the proper place.

# Lake Holattawatta


Recording sheet


Group Members:


 Number of tagged fish: \_\_\_\_\_



Sample #	Number of Tagged Fish	Total Number of Fish in Sample	Ratio $\frac{\text{tagged fish}}{\text{total sample}}$
1			
2			
3			
4			
5			

 Choose one ratio to represent the five ratios. Explain how you decided this was a representative ratio.

 If you mixed the fish well, should the fraction of tagged fish in a sample be nearly the same as the fraction of tagged fish in the whole lake? Why or Why not?


 Using the ratio you chose in Step 4, write and solve a proportion to find the number of fish in the lake (About how many beans are in the bag?)


## EXAMPLE

Assume you capture, tag and release 100 fish. You then recapture 200 fish, of which 4 are tagged. You will assume that the ratio of fish originally tagged to total fish in the lake is equivalent to the ratio of recaptured-tagged fish to total recaptured fish. In other words...

$$\frac{\text{(tagged original)}}{\text{(total-in-the-lake)}} \frac{100}{x} = \frac{4}{200} \frac{\text{(tagged recaptured)}}{\text{(total recaptured)}}$$

Solving the proportion yields a total lake population of 5,000 fish.

 Why is this method called capture-recapture?

 Actual Number of fish in Lake Hollatawatta: \_\_\_\_\_ Compare this value to your prediction in Step 6. How accurate are predictions using this method? Why?