Sampling and Predicting by Brian P. Dennis.

I came across an interesting website that gave information about *Sampling and Making Predictions*. The following is my version of the investigation of estimating the number of bees in a hive.

Have you ever wondered how biologists estimate the number of fish in a lake or birds in a flock? It would be impossible to count every one. In the case of honey bees, counting the legs and dividing by 6 doesn't help! The method used is *proportional reasoning.*

If you want to know the number of bees in a hive, take a small sample of about 30 bees. Mark each bee in the same way you would mark a queen. Return these marked bees to the hive. After some time, when you think the marked bees have mixed with the other bees in the colony, take another sample. Let's assume this sample contains 80 bees. In this sample there will likely be some of the marked bees from the first sample. Suppose there are 10 marked bees.

In effect you have the following proportion:

Sample 2		**Total Population**
No marked bees ÷ No of bees in sample	=	No marked bees ÷ No of bees in hive

Using the above example, we get:

10 ÷ 80 = 30 ÷ x, where x is the total number of bees in the hive.

$1/8^{th}$ of the bees in the second sample were marked. If that sample was a representative of the whole, it may be assumed that $1/8^{th}$ of the total population would be marked.

Solving the above equation, we get x = 240. Therefore, from our sample we can predict that there are 240 in the hive.

Since a strong colony would contain, we are told, approximately 50,000 bees, I'm not sure how this method would work in practice – the number of marked bees in the second sample would be low (or zero). I suppose you would need to introduce more than 30 marked bees into the hive. If you wanted to evaluate the method, a nucleus would be better.

The original article does state that predicting is only that – the accuracy of predictions depends on many factors e.g. sample size.

Brian P. Dennis. 2014.

This article appeared in Bee Improvement magazine. Issue 44. Summer 2014.

This version has been printed from Dave Cushman's website http://www.dave-cushman.net/