



The number of individuals in a population, or *population size*, is perhaps the most important thing to know about a population. This is most clear in cases where ecologists are working to help endangered species, when an accurate count or estimate of population size is critical to assessing their success. Ideally, population ecologists would have an exact count of all the individuals in a population at all times. Obviously, this would rarely be the case and, in most cases, accurately counting all the individuals in a population is impossible. This model is an in-depth exploration of the mark-recapture method of estimating population size

Model details

This model simulates a population of meadow voles that can be trapped, marked, released, and re-trapped (Figure 1). This advanced model assumes familiarity with the Lincoln-Peterson estimate of population size. It is designed to be used in exploring how factors such as: population distribution, trap experience (learning to avoid or seek out traps), population size, and sampling effort affect the precision and accuracy of the estimate.

Figure 1. Screen shot of the Mark-Recapture model



Table 1: Reporters for the Mark-Recapture model

Reporter	Description
Total Marked	The overall number of marked voles in the population
Marked In Traps	The number of voles currently in the traps that are marked
Total In Traps	The overall number of voles currently in the traps
L-P Est	The calculated Lincoln-Peterson estimate of population size
Actual N	The true number of voles in the population
% Error	The relative magnitude and direction of the deviation between the estimated and actual population size
Timer (hrs)	The amount of time the traps have been open (this is reset by releasing voles)

Table 2: Controls for the Mark-Recapture model

Control	Action
Reset	Clicking clears all values, resets model to current parameter settings
Go	Clicking sets the model in motion (clicking again will stop it)
Pop_Size	A drop-down menu to set the number of voles in the field (options: Small [25], Medium [50], Large [100])
Distribution	A drop-down menu to set the spacing of the voles (options: Random, Clumped, Uniform)
Trap_Experience	A drop-down menu to set the likelihood of a vole being trapped a second time relative to a first time (options: Neutral [equal], Negative [reduced], Positive [increased])
See_All?	When switched 'on', voles are always visible; when 'off', they are only visible when trapped
Num_Traps	Selects how many traps will be set out (options: 1,2,4,8). Note: when 'Go' is clicked traps can be dragged around with the mouse
Trap_Time	This slider adjusts how long the traps will remain open
Open/Close	Clicking opens all traps for the set time
Mark Voles	Marks all the trapped voles with a red dot
Release Voles	Frees all the voles from the traps
Unmark Voles	Removes the mark from all voles in the population