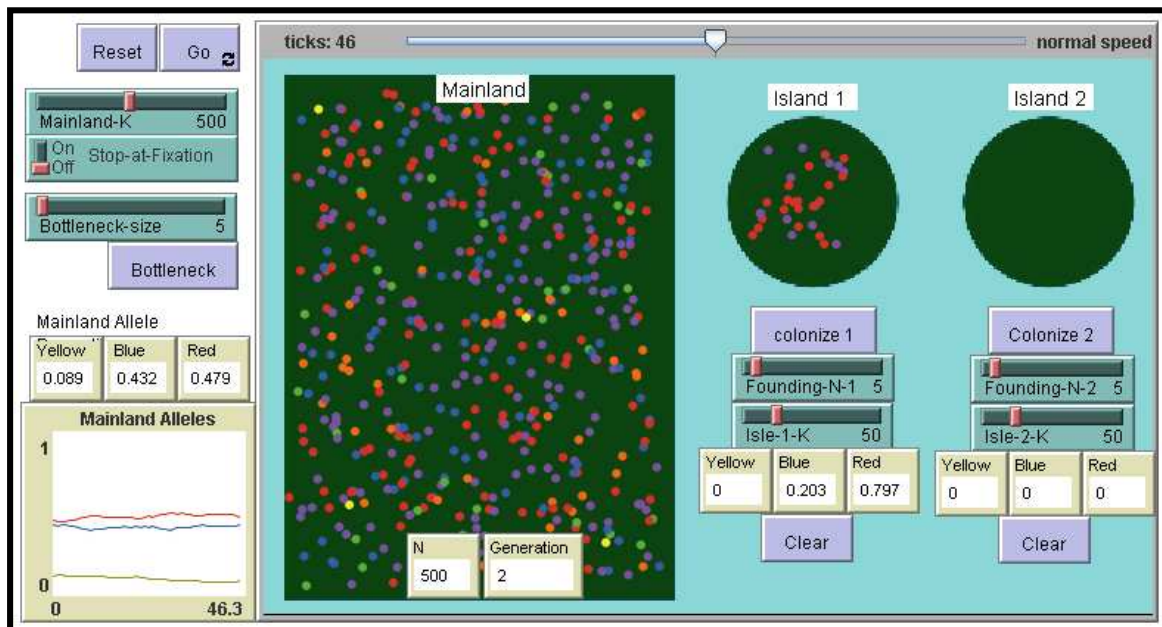Random sampling 'errors' can affect allele proportions in populations. These phenomena are called 'genetic drift' in persistently small populations, 'bottleneck effects' if a naturally large population is temporarily knocked down to a few individuals, and 'founder effects' when describing new populations being founded by a few individuals. This exercise will quantify two of these effects in a simulated population.

Model Details

In this model there is a mainland, and two islands (Fig. 1). Initially only the mainland is populated with individuals (circles) displaying different phenotypes (color). In this case color is determined by one gene with incomplete dominance, for which there are three alleles (Yellow, Blue and Red). The heterozygous phenotype is the blend of the two alleles (e.g. a heterozgote Yellow/Red appears orange). Individuals in the populations breed and die randomly over time, and the populations will grow and remain at a particular size. The model is run and results are shown by controls and reporters (Table 1).

Figure 1: Screen shot of 'Random Genetic Effects' simulation

Table 1: Controls and reporters for 'Random Genetic Effects' simulation

Control	Effect
Setup	Resets the model to the parameters shown
Go	Sets the model in motion, individuals breeding and dying
Speed Slider	Above the world view, adjusts the simulation speed
Mainland-K	The stable population size of the mainland
Stop-at-Fixation	Stops the simulation if a mainland allele proportion hits 1.0
Bottleneck-Size	The number that will survive a bottleneck event
Bottleneck	Culls the mainland population to the Bottleneck-Size
Colonize-(1 & 2)	Seeds the an island from a founding population Isle-1 is founded from the mainland, and Isle-2 from Isle-1 (note: there must be enough individuals in the source population to seed the new population
Founding-N-(1 & 2)	The number of founding individuals
Isle-(1 & 2)-K	The stable population sizes of the islands
Clear (1 & 2)	Removes all individuals from the associated island
Reporter	**Description**
Mainland Allele Props.	Proportion of the Yellow, Blue, and Red alleles on mainland
Mainland Allele Graph	Graph of the allele proportions over time
N	The current mainland population size
Generation	The number of generations since the start of the simulation
Island Allele Props.	Proportion of the Yellow, Blue, and Red alleles on the islands