Demographic history

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Looking at the change in popualtion sizes.

1 The fixation of neutral mutations

For any locus, $2N\mu$ mutations enter a population each generation. Each new neutral mutation has a probability of being fixed equal to its initial frequency. The average number of substitutions per locus per generation is equal to the product of these:

$$2N\mu \times 1/(2N) = \mu \tag{1}$$

$$time to fixation = 4N_e \tag{2}$$

Constant populations: Drift mutation equation, mutation and fixation balanced, amount of genetic variation remains constant
Expanding populations Mutations faster than fixation, amount of genetic variation increases, excess of rare polymorphisms
Contracting populations Fixation faster than mutations, amount of genetic variation decreases, rare polymorphisms go extinct