Estimation of the variance effective population size in age-structured populations

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The variance effective population size is an important parameter in population genetics and conservational biology. It quantifies the amount of genetic drift in the population and makes it possible to compare populations with different demographic parameters. The temporal method is commonly used to estimate the variance effective population size in real populations. By comparing two samples, separated by time, of genes from the population the standardized variance of allele frequency change can be estimated. This variance can be transformed to an estimate of the variance effective population size.

In this presentation we consider populations of haploid individuals with overlapping generations where the age class sizes fluctuate. In such populations, the variance effective population size will depend on how the different age classes are weighted together, and can be defined as a function of these weights. Ignoring the age structure can lead to biased estimates when estimating the variance effective population size with the temporal method.

Here, we present a new method for estimation of the variance effective population size in age-structured populations. By sampling individuals from all age classes and assuming that the age specific birth and survival rates are known, we obtain unbiased estimates.

Keywords: Overlapping generations, temporal method, fluctuating population size.