Natal philopatry model: diploid genetics, sexual reproduction 16.03.2015

In the diploid, sexual model each individual has two alleles at the gene-locus of interest, i.e. each individual has two A0 alleles, two A1 alleles, two B0 alleles and two B1 alleles. An individual’s phenotype at the relevant gene locus (A0, A1, B0, B1) is determined by the mean of the two alleles (additive gene action), and it is the phenotype that specifies the joining and accepting probabilities according to the equations we used before:

with B0= mean(B01, B02), B1= mean (B11, B12), etc.

Reproduction

Each time an offspring is produced, with probability ½ it’s a daughter, else it’s a son. Daughters stay on the natal patch with a probability given by x(n)\* y(n) (as before). All sons disperse and join a pool of floating males, i.e. we have two separate floater pools now, one consisting of dispersed females, one consisting of males. Male floaters survive from one time step to the next with survival probability SM (0.8).

Inheritance/ Recombination

At each gene locus, all offspring produced inherit one allele from their mother and one allele from their father. Alleles are drawn at random from the two alleles each parent has at each locus, i.e.,

Offspring A01= prob= ½ mother A01, else mother A02,

Offspring A02= prob= ½ father A01, else father A02,

Offspring A11= prob= ½ mother A11, else mother A12,

Offspring A12= prob= ½ father A11, else father A12,

etc.

Once an offspring has been assigned all its eight alleles, mutation occurs at each allele as before.

Random mating vs male residency

We consider two possible mating systems:

1) Random mating

Under this scenario, in each breeding bout, each female breeder mates with a randomly chosen male, which is drawn at random from the pool of male floaters. In other words, males are not associated with females. At the start of the simulations there are nMF= 900 floater males in the population.

2) Male residency

Under this scenario males are permanently associated with females. In addition to the females, there is one breeding male on each patch. Males do not occupy female breeding sites and survive with probability SMB (0.8). Whenever a male breeder dies, a new male is drawn at random from the pool of male floaters to occupy the vacant breeding position. All females at a patch mate exclusively with the male breeder on their patch! At the start of the simulations 90% of patches are occupied with both a breeding female and a breeding male (i.e., a breeding pair).