

Conservation Genetics Homework #1

Name: _____

1) Explain why Hardy-Weinberg Equilibrium and Linkage Equilibrium can both be considered null models.

2) Ten individuals from a population of Great Gray Spotted Sedge (*Arctopsyche grandis*) is genotyped at two diallelic loci, A and B . In the resulting sample, five individuals are homozygous for the haplotype A_1B_1 and five individuals are homozygous for the haplotype A_2B_2 . Are A and B linked? Why or why not?

3) A graduate student in the Department of Ecology genotypes 400 Ferruginous Hawks in Oregon ("Pop 1") and 400 Ferruginous Hawks east of the Continental Divide in Montana ("Pop 2"). In Pop 1 they find 324 birds are homozygous recessive, 72 birds are heterozygous, and 4 birds are homozygous dominant. In Pop 2 they find 196 birds are homozygous recessive, 168 birds are heterozygous, and 36 birds are homozygous dominant. Determine the total number of A and a alleles in each subpopulation, as well as their relative frequencies. Next, pool the allele counts for Pop 1 and Pop 2 and do the same for the "global" population of hawks in the study (i.e., treat all hawks as belonging to the same population).

a. What are the expected genotype frequencies of Pop 1 under HWE?

$$f(AA) = \quad \quad \quad f(Aa) = \quad \quad \quad f(aa) = \quad \quad \quad$$

b. What are the expected genotype frequencies of Pop 2 under HWE?

$$f(AA) = \quad \quad \quad f(Aa) = \quad \quad \quad f(aa) = \quad \quad \quad$$

c. What are the expected genotype frequencies of the global population under HWE?

$$f(AA) = \quad \quad \quad f(Aa) = \quad \quad \quad f(aa) = \quad \quad \quad$$

d. Is Pop 1 currently under HWE?* (YES / NO)
Is Pop 2 currently under HWE?* (YES / NO)
Is the global population currently in HWE?* (YES / NO)

* don't worry about performing a χ^2 test!