

Conservation Genetics Homework #7

Name: _____

- 1) The Eurasian Skylark was introduced to Vancouver Island in 1903 and persists to this day in small numbers, nearly 3000 miles from the nearest large natural population in Russia. An ornithologist interested in the consequences of this introduction genotypes 20 individuals from Vancouver and 20 from Kamchatka in eastern Russia. The Vancouver population is composed of 5 A_1A_1 individuals, 4 A_1A_2 individuals, and 11 A_2A_2 individuals; in the Russian population, there are 8 A_1A_1 individuals, 9 A_1A_2 individuals, and 3 A_2A_2 individuals.
- a. Calculate inbreeding coefficient ($F_{IS} = 1 - \frac{H_o}{H_e}$) for both populations and Wright's fixation index ($F_{ST} = 1 - \frac{H_s}{H_t}$) for all sampled skylarks. To do so, remember that H_s is the weighted average of the expected heterozygosity of each subpopulation, while H_t is the expected heterozygosity calculated over all individuals.
- b. Wright's fixation index can also be calculated as $F_{ST} = \frac{1}{4N_em+1}$. Using your answer to 1a and assuming an N_e of 1000, estimate the effective number of migrants (N_em) exchanged between Russia and Vancouver each generation.
- c. Interpret your findings. Is this a significant level of differentiation? In the absence of natural selection, do you expect Vancouver and Russian skylarks to merit treatment as distinct conservation units based on these data alone?
- d. How would F_{ST} change under the following circumstances? Assume a sample size of 20.
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|---|-----------------------------------|
| ...if there were only 1 A_1A_1 individual on Vancouver? | (DECREASE / INCREASE / NO CHANGE) |
| ...if there were 10 A_1A_2 individuals on Vancouver? | (DECREASE / INCREASE / NO CHANGE) |
| ...if the estimated N_e decreased, but m stayed constant? | (DECREASE / INCREASE / NO CHANGE) |
| ...if the estimated N_e stayed the same, but m increased? | (DECREASE / INCREASE / NO CHANGE) |