

1077-92-1995

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Metapopulation Modeling and Analysis with Demographic Stochasticity. Preliminary report.

As human expansion claims more land, previously connected habitats become fragmented, converting larger populations into smaller subpopulations connected through migration. Demographic stochasticity has been shown to have a significant effect in small populations. We explore how taking demographic stochasticity into account affects metapopulations which are typically made up of small subpopulations. We develop a density dependent models using Markov matrices to simulate a metapopulation and compare the predictions with those of a deterministic model. We compare the asymptotic population size of the deterministic model with the mean time to extinction and the quasi stationary distributions predicted by the Markov model. We show that there is a significant difference between the two models under certain conditions and that the deterministic model often overestimates metapopulation persistence. (Received September 21, 2011)