

Evolution of dispersal by memory and learning in integrodifference equation models

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We discuss an integrodifference equation model that incorporates spatial memory and learning so that each year, a fraction of the population uses the same dispersal kernel as the previous year, and the remaining individuals return to where they bred or were born. In temporally static environments, the equilibrium of the system corresponds to an ideal free dispersal strategy, which is evolutionarily stable. We prove local stability of this equilibrium in a special case, and we observe convergence towards this equilibrium in numerical computations. When there are periodic or stochastic temporal changes in the environment, the population is less able to match the environment but is able to do so to some extent depending on the parameters. Overall, the mechanism proposed in this model shows a possible way for the dispersal kernel of a population to evolve towards an ideal free dispersal kernel.

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