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Dispersal Redistribution Approximation

Integrodifference equations (IDEs) are often used as discrete-time models for populations with distinct growth and dispersal stages. Most studies of these systems simplify the model by assuming either homogeneous dispersal, isolated single patches, or spatial or temporal periodicity. However, patchy landscape with bias at patch boundaries are often of interest and can lead to asymmetric and discontinuous dispersal kernels. In this case, the non-trivial solution of the IDE is a piecewise continuous function. Using a partial integral of the dispersal kernel known as the redistribution function, I derive an approximation of the non-trivial steady-state solution of the IDE model with a discontinuous, asymmetric kernel modeling dispersal and growth on a patchy landscape. The error of the this Dispersal Redistribution Approximation (DRA) is a decreasing function of the bias at patch boundaries. This work is joint with Dr. James Watmough.