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A two-patch predator-prey model with adaptive habitancy of predators

A two-patch predator-prey model with the Holling type II functional response is studied, in which predators are assumed to adopt adaptive dispersal to inhabit the better patch in order to gain more fitness. Analytical conditions for the persistence and extinction of predators are obtained under different scenarios of the model. Numerical simulations are conducted which show that adaptive dispersal can stabilize the system with either weak or strong adaptation, when prey and predators tend to a globally stable equilibrium in one isolated patch and tend to limit cycles in the other. Furthermore, it is observed that the adaptive dispersal may cause torus bifurcation for the model when the prey and predators population tend to limit cycles in each isolated patch.