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leoncior rodriguez-quinones* (leoncio.quinones@usu.edu), **Luis Gordillo** (luis.gordillo@usu.edu) and **Jia Zhao** (jia.zhao@usu.edu). *The effects of simple density-dependent prey diffusion and refuge in a predator-prey system.*

We study a spatial (two-dimensional) Rosenzweig-MacArthur model under the following assumptions: (1) prey spread follows a nonlinear diffusion rule, (2) preys have a refuge zone (sometimes called “protection zone”) where predators cannot enter, (3) predators move following linear diffusion. We present a bifurcation analysis for the system that shows the existence of positive solutions at the steady state. We complement the theoretical results with numerical computations and compare our results with those obtained in the case of having linear diffusion for the prey movement. Our results show that both models, with linear and nonlinear diffusion for the prey, have the same bifurcation point and the positive solution curves are virtually the same in a neighborhood of this point, but they get drastically different as the bifurcation parameter approaches to zero. (Received August 12, 2020)