JENNIFER LAWSON, University of Calgary

Impact and Interplay of Harvesting and Diffusion Strategy on Competition Outcomes

Within the field of ecology, understanding the relationship between a population and its environment is crucial for effective population management. Over the past few years, spatial models with a 'biased' type of diffusion have been developed to help enhance this understanding. We consider a model with biased diffusion term, $\Delta(u(t,x)/P(x))$ where $P(x)$ is the diffusion strategy chosen by species u.

In this talk, we will examine the impact and interplay of harvesting deduction and the choice of diffusion strategy on competition outcomes for two-resource sharing species by analyzing the principal eigenvalues of the system. Previous studies on the impact of harvesting required it to be spatially identical to the growth rate. Here, we consider a more general form of harvesting and we will develop a spatial arrangement of harvesting, dependent on diffusion strategy, that can push two populations to coexist. Further, we will also examine the impact of perturbations to harvesting policies and diffusion strategies, and show that very small perturbations do not affect the populations' ability to coexist. Finally, we will consider a situation with two invading species, where the invader chooses a diffusion strategy that mimics the spatial distribution of the resident species. We will show that when the invader has a higher carrying capacity, it is guaranteed to have a successful invasion. However, numerical simulations show that invasion may be successful even without an advantage in carrying capacity.