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Confinement effects on movement and predator-prey dynamics: where does the fox stay?

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Issues relating to the environment have received growing attention over the last number of years and are emerging as a top priority for Canadians. The impact on the environment from both natural processes and human activities has manifested in a variety of ecological and health issues with both short and long-term ramifications. One important area of research is the study of animal movement in complex landscapes, which encompasses a broad array of research disciplines and can provide us with a wealth of information on habitats and resources. Despite the importance of studying animal movement, it has only recently attracted considerable attention due to the introduction of a variety of technological advancements (e.g. tracking devices, landscape mapping) that have helped to alleviate many of the technical challenges experienced in the field. The study of animal movement (dispersal, migration) has also drawn considerable attention due to a variety of pressing ecological and health issues, such as: worldwide spread of non-indigenous species, changes in species distributions as a result of habitat loss and fragmentation, and the role of animals as vectors of diseases, among others.

In this talk, I will discuss our recent studies on the effects of confinement and landscape fragmentation on predator-prey dynamics through the use of a robust individual-based movement model (IBMM). The relative foraging efficiency for different predator (and prey) search models is examined, including the area-restrictive search, Lévy walk, and a composite correlated random walk (CCRW) model, under different confinement and fragmentation conditions. In addition, a number of movement metrics are calculated, including the move-length distribution, the net squared displacement, the radius of gyration, and the turning-angle correlation function, to examine the effects of confinement on scaling behaviour. The simulation results will be compared with recent field studies that we have conducted on the red fox of Prince Edward Island and the wild dog of South Africa.

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