Mathematical Biology Seminar

Monday, October 19, 2009
3 pm – 657 CAB

Jim R. Muirhead
U of Alberta

Modelling human-mediated dispersal and establishment of aquatic invasive species

A leading conceptual model of the invasion process suggests that nonindigenous species (NIS) must pass through a series of 'filters' when dispersing from colonized to non-colonized regions. These steps include the initial dispersal of propagules and survival of these propagules upon encountering the new physicochemical environment. Here, I model human-mediated dispersal and establishment of two related aquatic NIS, the spiny waterflea *Bythotrephes longimanus*, and fishhook waterflea, *Cercopagis pengoi* using stochastic gravity models to assess movement of propagules. The stochastic gravity models include information on movement patterns of recreationalists and characteristics of destinations that influence relative boater traffic between lakes. I then incorporate boater traffic as input into a subsequent establishment model with data on lake physicochemistry. The model with the addition of lake physicochemistry was significantly better at predicting establishment success for *Cercopagis* than the model with recreational boater traffic alone.

I also explore the tradeoff between the ability of different classes of gravity models to model the pattern of recreational boat traffic and the ability to predict *Bythotrephes* invasions in Ontario. These models differ in the type of information require to parameterize the model and constraints under which pairwise trips between sources and destinations are estimated. The unconstrained gravity model was best at modeling the number of pairwise trips between sources and destinations, but was a poor predictor of *Bythotrephes* presence/absence. In contrast, the model with the most constraints and required the most data was the best predictor of invasions, but provided the worst fit to observed boater traffic. As a consequence, the choice of gravity model has implications for the risk assessment and management of human-mediated NIS transport.

Join us for refreshments in CAB 549 immediately following the Seminar

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