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Recent application of spreading speed theory to the green crab invasion in Atlantic Canada

Spreading speed theory provides a mathematical tool to analyze the demography and dispersal of invasive species. Based on biological records, the secondary spread of the European green crab, *Carcinus maenas*, has maintained a relatively consistent rate of advance for over 120 years covering a wide range of temperate latitudes and local hydrological environments along the Atlantic coast of North America. We analyzed presence/absence data for recently established green crab populations, empirically estimated the crab's spread rate, and employed a discrete-time model to investigate the relationship between the spreading speed and demography and dispersal parameters. The model couples a matrix population model for population growth with integrodifference equations for dispersal. Hydrodynamically-driven dispersal, predominantly larval dispersal, is assumed in our model and estimated by a hydrodynamics model through particle tracking. Our modeling exercise provided insights about the observed pattern of green crab spread, including the possibility of maintaining a consistent spread rate despite stochastic drift which influences larval dispersal. Sensitivity analysis of the model also informed us about possible green crab demographic and dispersal processes that could be targeted by managers.