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When to Spray: A Time Scale Calculus Approach to Controlling the Impact of West Nile Virus.

West Nile Virus made its initial appearance in the New York City metropolitan area in 1999 and was implicated in cases of human encephalitis and the extensive mortality in crows (Corvus species) and other avian species. Mosquitoes were determined to be the primary vectors and NYC's current policy on control strategies involved an eradication program that is dependent on the synchronicity of the summer mosquito population's increases with the occurrence of cases in humans. The purpose of this talk is to investigate whether this is the most effective control strategy because past mathematical models assumed discrete behavior that is modeled by difference equations for a single summer season, was most important to the virus's development cycle. However, both surviving mosquito eggs and surviving migratory birds incubate the virus during the winter leading to a continuation of infections the following warmer spring and summer when the birds return and the eggs hatch. Additionally, the virulence of WNV has been observed to fluctuate with changes in temperature towards warmer conditions. (Received August 24, 2009)