

Mosquito Model with Waterways and Temperature-Dependent Population Dynamics

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We developed a mathematical pde model for mosquitoes that links temperature and flooding in rivers and waterways in cities to the abundance of the *Culex* mosquitoes that vector West Nile Virus. Our models predict mosquito fluctuations well in municipal regions where waterways are minimally managed but they fail where waterways are managed intensively to mitigate flooding due to heavy precipitation. We provide evidence that floods in Toronto in 2013 and 2017 enabled dramatic mosquito population increases in outlying regions of the city, but not in the city center. Although Chicago experienced similarly heavy precipitation in these years, flooding and abnormal mosquito population increases were not detectable in Chicago waterways and mosquito trap data.

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