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Modeling and control of enzootic West Nile virus transmission: The role of the avian nesting curve

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Title: Modeling and control of enzootic *West Nile virus* transmission: The role of the avian nesting curve

Abstract: Introduced into the United States in 1999, *West Nile virus* (WNV) remains a major public health concern. The ecological mechanisms responsible for the timing and magnitude of seasonal transmission are not well understood, though outbreaks have been widely observed to be associated with the end of the avian nesting season. Newly hatched birds, or nestlings, have less feather coverage and fewer defense mechanisms than older birds, rendering them more vulnerable to mosquitoes. The rate at which new nestlings are produced is determined by the avian nesting curve, which can vary with avian species and is also influenced by climate. We use a mathematical model incorporating avian (host) stage-structure and within-species heterogeneity in the form of stage-specific mosquito (vector) biting rates to investigate the connection between properties of the avian nesting curve and enzootic WNV transmission, as well as implications for control of WNV.