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# Modeling Allee effects in a transgenic mosquito population during range expansion

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**Title:** Modeling Allee effects in a transgenic mosquito population during range expansion

**Abstract:** Mosquitoes are vectors for many diseases that cause significant mortality and morbidity. As mosquito populations expand their range, they may undergo mate-finding Allee effects such that their ability to successfully reproduce becomes difficult at low population density. With new technology, creating target specific gene modification may be a viable method for mosquito population control. We develop a mathematical model to investigate the effects of releasing transgenic mosquitoes into newly established, low-density mosquito populations. Our model consists of two life stages (aquatic and adults), which are divided into three genetically distinct groups: heterogeneous and homogeneous transgenic that cause female infertility and a homogeneous wild type. We perform analytical and numerical analyses on the equilibria to determine the level of saturation needed to eliminate mosquitoes in a given area. This model demonstrates the potential for a gene drive system to reduce the spread of invading mosquito populations.