

Comparison of Deterministic and Stochastic Approaches to Modeling the Effects of Interactive Invading Species on Native Flora

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Abstract

Invasive species are known to destroy native flora and fauna when introduced into habitats in which they are non-indigenous. Two exotic invasive species, strawberry guava and feral pigs, have been introduced to Hawaii and have had a devastating impact on native plant species. This problem is compounded by the fact that the presence of feral pigs enhances the dispersal of strawberry guava, causing an even more detrimental impact on native flora. In an attempt to better understand this problem and its possible solutions, we develop and analyze two systems of ordinary differential equations. The first system consists of two equations, one modeling native plant growth and the other modeling growth of strawberry guava. The second system, consisting of three equations, introduces the effects of feral pigs. These systems are analyzed using both deterministic and stochastic approaches in an effort to compare the results of different modeling methodologies.