Abstract Simple population models predict that the spread of an invading species through a homogenous

Three phases to the biological invasion processes are widely recognised: arrival, establishment, and spread (Mack et al. 2002

MIXED, SAS Institute Inc. 2004). We selected this technique based on the abundance of covariance structures available with this estimation method. We used the Kenward–Rogers denominator degrees of freedom method as it has been shown to be the most robust degrees of freedom method with repeated

accidental transportation of infested host material into previously uninfested regions.

Estimated spread rates of the adelgid in each of the

appears to have diminished over time and this may reflect an opposing positive effect of winter temperatures on adelgid spread as the range has expanded to

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