

Ecology and Dispersal of *Pyrus calleryana* in a Central Hardwood Forest

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Abstract

Callery pear, *Pyrus calleryana*, is a popular ornamental species that has been planted abundantly across the United States since the 1950s and has since developed into an invasive species. One particularly aggressive invasion exists on Naval Support Activity Crane in Crane, Indiana. This invasion dominates the understory of several stands within an oak-hickory forest with stem densities exceeding reported density of other aggressive woody understory invasive species such as, bush honeysuckle in similar Central Hardwood forest stands. The presence of *P. calleryana* in the understory could pose a significant impact on the forest community by reducing species diversity and suppressing regeneration of more economically and ecologically valuable tree species. As such, identifying environmental and genetic factors contributing to the success of *P. calleryana* within this invasion represents an important line of research. In this study, I propose to identify the mode of dispersal of this species through the Crane invasion. The study will also investigate characteristics of invaded environments and age assessments will be made to document timeline of invasion and behavior of *P. calleryana* in a forest understory. Genetic analysis will assess the degree of hybridization and relatedness of individuals across the Crane population with respect to dispersal. Results from this work will contribute to effective management strategies that could slow the spread of this emerging invasive in Central Hardwood forest stands.

Introduction

Identifying and understanding the effects of invasive species and their mechanisms of spread are essential to control and eradication.

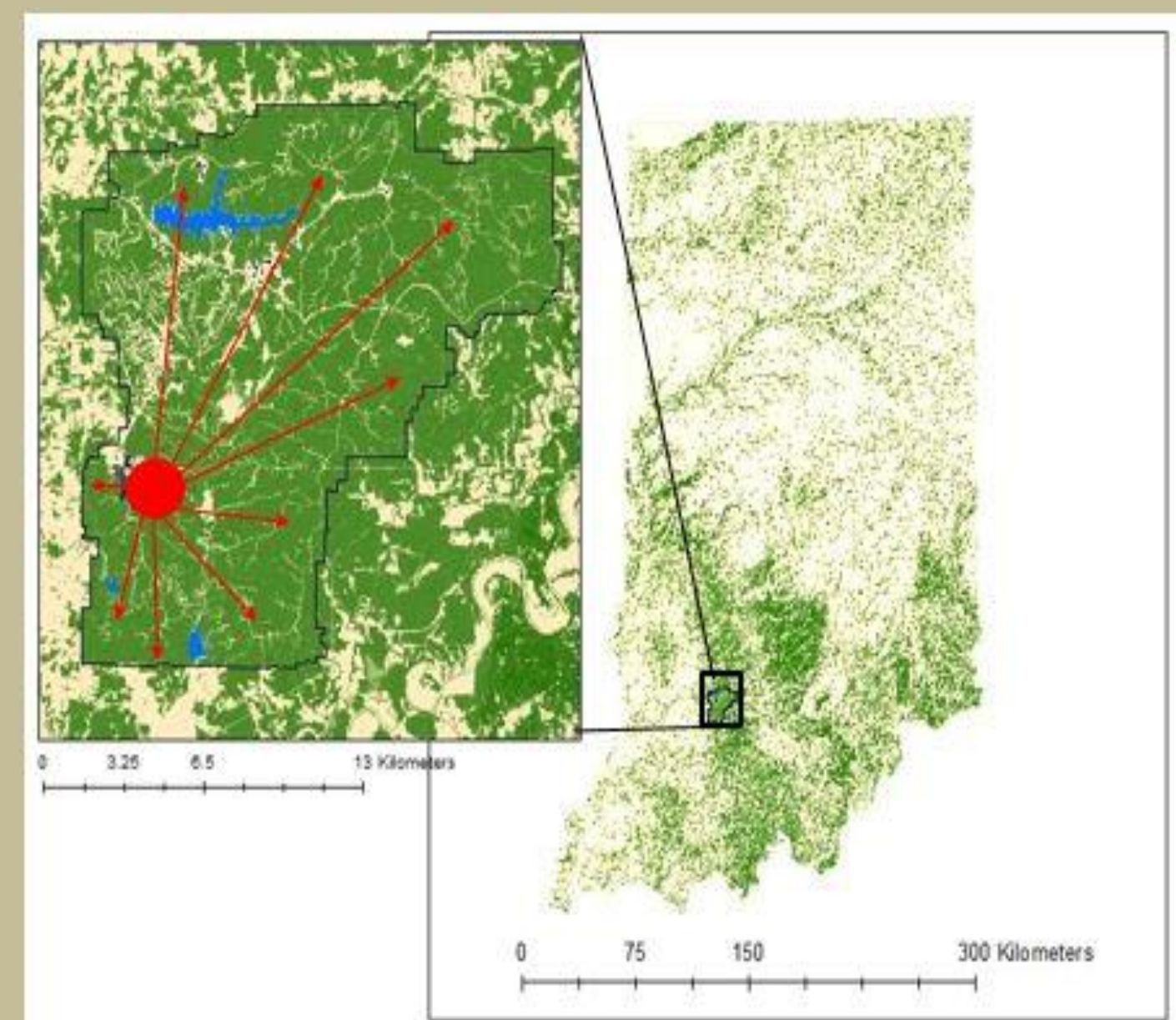
This study focuses on the ecological effect of presence and density of a wild population of Callery pear (*Pyrus calleryana*) on the surrounding forest in southern Indiana.

This research also seeks to assess dominate modes of dispersal for Callery pear.

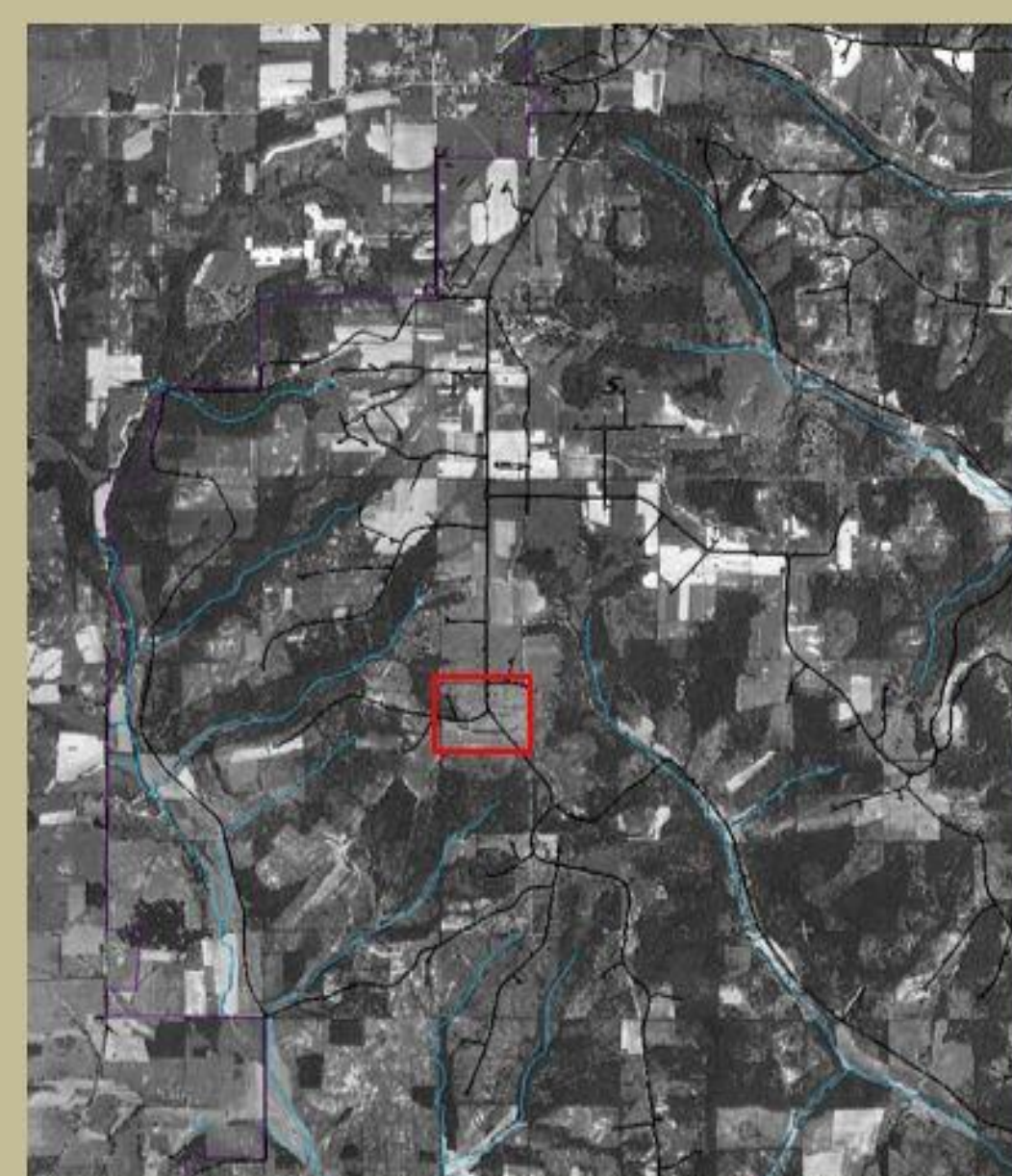


History and Current Extent

Pyrus calleryana was established in the area prior to 1930 as part of a nursery and remained on base until a genetically distinct pollen source was introduced in the 1970s.



Legend
— NSA Crane Boundary
■ Lakes
Percent Canopy Cover
■ 0 - 16
■ 16 - 43
■ 43 - 63
■ 63 - 79
■ 79 - 127
■ Invasion Expansor



Legend
— NSA Crane Boundary
— Historic Tree Rows
— Roads
— Streams
■ Lakes

Study Goals



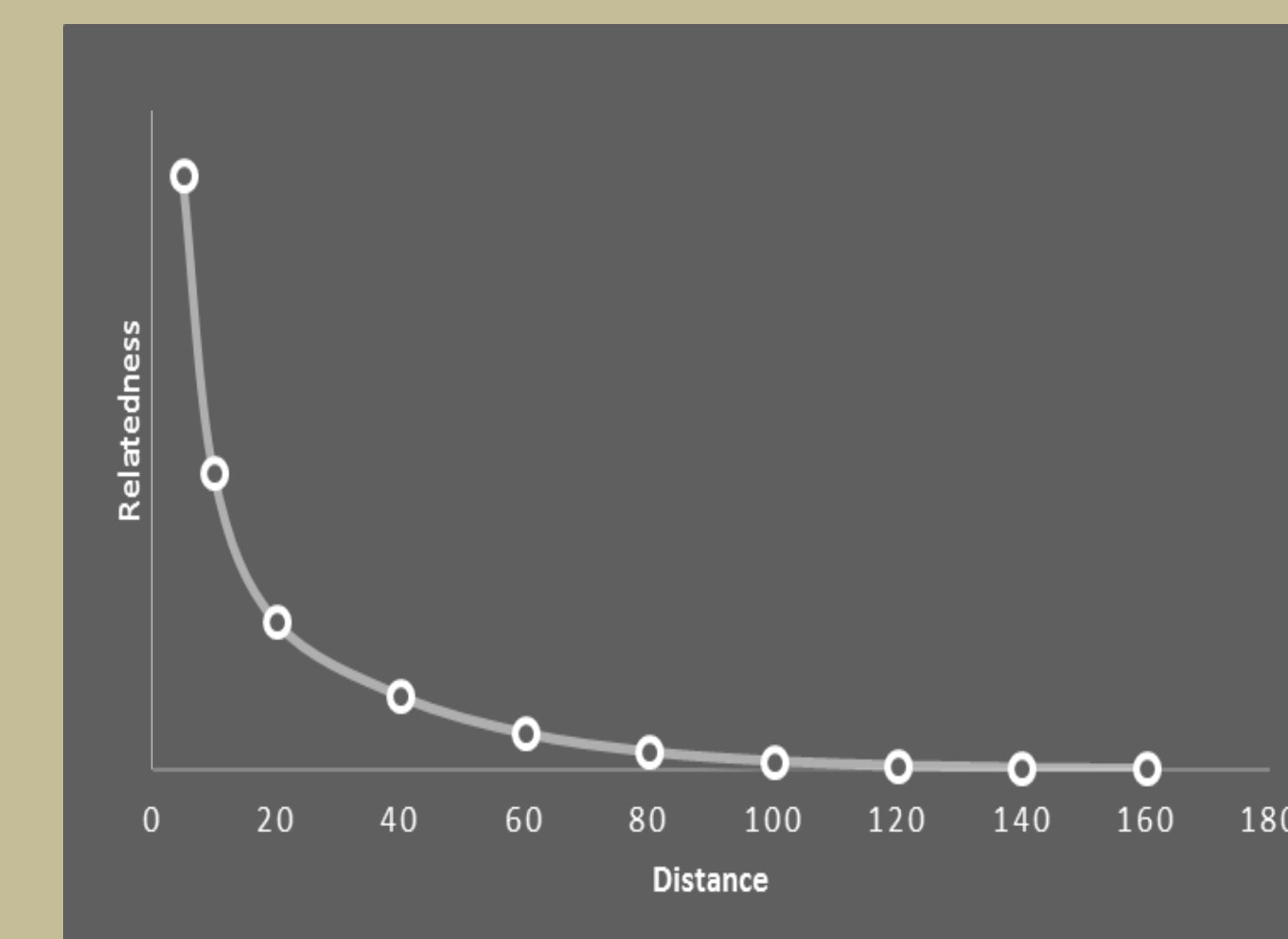
1. Describe the dominant successful mechanism of dispersal through spatial analysis of genetic relatedness.
2. Understand how pollen and seed dispersal mechanisms are impacting spread.
3. Investigate effects of the presence and density of *P. calleryana* on the surrounding forest.

Hypotheses

H1: High density of *P. calleryana* will occur nearest the historic invasion and be characterized by a mixture of old and young cohorts with high genetic diversity.

H2: Invasion edges will be characterized by lower density, dominated by younger cohorts, and exhibiting lower levels of genetic diversity.

Both hypotheses will be assessed through over 500 randomly placed plots across the base. Each will document overstory basal area and density, percent canopy cover, density of P. calleryana, and age of oldest P. calleryana individual. Genetic samples will be taken of individuals at each plot.



Expected relationship of genetic relatedness to increasing distance according to our hypothesis

H3: Pollen dispersal of *P. calleryana* is primarily diffuse, occurring over short distances limiting success of long-distance dispersal events.

Genetic analysis will be used to document relatedness across spatial scales by selection of 10 Mother trees. Samples will be collected from the mother tree and youngest cohort at 5 set distances in each of the cardinal directions. The spatial relationship to genetic diversity will provide important insight into mechanisms of spread for this invasive species.

Acknowledgements and Literature Cited



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