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Conservation Status of a Threatened Tree Species: Establishing a Baseline for Restoration of *Juglans cinerea* L. in the Southern Appalachian Mountains, USA

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ABSTRACT:

To mitigate the loss of native tree species threatened by non-native pathogens, managers need to better understand the conservation status of remaining populations and the conditions that favor successful regeneration. Populations of *Juglans cinerea* L. (butternut), a wide-ranging riparian species, have been devastated by butternut canker, a disease caused by a non-native fungal pathogen. We assessed *J. cinerea* within Great Smoky Mountains National Park (GSMNP) to determine post-disease survivorship and health, recruitment history, environmental conditions associated with survival, and the extent of hybridization with a non-native congener. Monitoring records were used to locate and collect data for 207 *J. cinerea* trees in 19 watersheds. Tree cores were collected from a subset of individuals to assess recruitment history. We sampled vegetation plots within areas that contained *J. cinerea* to assess site conditions and overstory species composition of characteristic habitat. We collected leaf samples for genetic analysis to determine the

frequency of hybridization. Our reassessment of monitoring records suggests that *J. cinerea* abundance in GSMNP has declined due to butternut canker and thirty years of poor regeneration. Populations displayed continuous recruitment following Park establishment (1934) until around 1980, after which regeneration declined drastically. Ordination analysis revealed that *J. cinerea* in the contemporary forest was associated with greater distance from homesites and reduced basal area of competing species. Hybrids comprised a small portion of sampled trees. The presence of healthy trees and low rate of hybridization suggest that these trees may contribute to the development of disease-resistant genotypes for future restoration efforts.

Keywords: [butternut](#), [cohort structure](#), [disturbance regime](#), [forest disease](#), [fungal pathogen](#), [hybridization](#), [mortality](#), [recruitment history](#)

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