

Imminent Failure of Forest Regeneration Requires Sustained Management in George Washington Memorial Parkway

Introduction

Forests are a key part of the landscape and visitor experience in George Washington Memorial Parkway (GWMP). Forest ecosystems are facing many stressors, including non-native plants, invasive tree pests, overabundant deer, lack of fire, and adjacent development affecting incoming water levels and wind exposure. These stressors diminish forest resilience, defined as the ability of an ecosystem to experience disturbance and rebound to similar functions, structure, and composition. A lack of tree regeneration—seedlings and saplings of canopy-forming trees—is an early indicator of reduced resilience and potential for future forest loss.

A recent study by several NPS Inventory and Monitoring networks assessed regeneration metrics in 39 parks from 2008 to 2019, including at GWMP. Parks were placed in one of four regeneration categories (Secure, Insecure, Probable Failure, and Imminent Failure), based on a variety of metrics that represent the amount and diversity of tree regeneration. Forests in 27 of 39 parks were classified in either imminent or probable failure categories due to a lack of seedlings and saplings in the understory. *The study identified overabundant white-tailed deer and invasive plants as the leading causes of concern for forest regeneration.* For more detailed information on the full study, see the source publication in the Resources section below.



Hungry white-tailed deer can eat much of the vegetation in a forest that is within their reach.
NPS

Main Findings

As of data collected through 2019, on a four-category scale (Secure, Insecure, Probable Failure, and Imminent Failure), GWMP has a forest regeneration status of **Imminent Failure**. This designation means that the park is experiencing severe regeneration failure and may no longer be recognizable forest in the future. Since park forests don't contain enough seedlings and saplings of native canopy-forming trees, canopy gaps caused by storms or insect pests are likely to convert to impenetrable thickets of invasive shrubs and vines, leading to forest loss.

Forests in GWMP also have regeneration mismatch between the forest canopy layer and seedling layer due to an abundance of regeneration from species which do not form an overstory canopy, including pawpaw (*Asimina triloba*), which is native but short-statured, and ash, a once common canopy tree that has been decimated by the recent wave of emerald ash borer infestation. The continued presence of EAB in the Mid-Atlantic makes it unlikely these ash seedlings will survive to be a part of future canopies. As the park's forests mature and overstory trees die, these short-statured or doomed native trees and non-native shrubs (such as *Viburnum dilatatum*) may rapidly increase further limiting the ability of canopy tree species to regenerate and eventually altering the composition and structure of the forests.



The understory tree, pawpaw (*Asimina triloba*), is very common at GWMP as it is unpalatable to deer and does not face the same level of browse stress as other native species.

Credit: Chris Evans, University of Illinois, Bugwood.org

Management Recommendations

Eastern national parks need sustained, [integrated forest management](#) to secure sufficient regeneration and avoid future forest loss. We suggest that managers at GWMP:

- Consider implementing deer population reductions to protect forest regeneration from browse impacts and allow seedling and sapling recovery.
- Continue to remove invasive plants through methods including early detection and rapid response and strategic invasive plant management in high priority habitats. Focus especially on controlling [vines along forest edges](#) as monitoring has shown that vines in crown and proximity to edges increase tree mortality. Also consider release of approved biological controls.
- Consider tools available to address forest insect pests and pathogens. Assess forest stands at risk or already impacted (such as those damaged by emerald ash borer) and prioritize invasive plant management where canopy gaps have increased or may increase soon.
- Continue to explore creative ways to advance integrated forest management in the park (e.g., developing and implementing a GWMP urban forest management plan, as currently in preparation in collaboration with Virginia Tech).

Not only continuing but expanding these management efforts are especially important for GWMP since without them, the park is at high risk of losing forest cover along with its ecosystem services, habitat for vulnerable species of plants and animals, and connectivity with other natural areas. With conditions changing rapidly, NPS park and regional staff should continue to use an adaptive management lens, by frequently re-assessing forest conditions and assessing management effectiveness using long-term ecological monitoring data collected by the park and the Inventory and Monitoring program. Please refer to the source publication for more information on management strategies and reach out to the contact below for further assistance.

Resources

Source Publication: Miller K., Perles S., Schmit J.P., Matthews E., Weed A., Comiskey J., Marshall M., Nelson P., Fisichelli N. (2023). Overabundant deer and invasive plants drive widespread regeneration debt in eastern national parks. *Ecological Applications*. <https://doi.org/10.1002/eap.2837>

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Links:

[Managing Resilient Forests Initiative for Eastern National Parks](#)

To see more park briefs, visit this link: <https://schoodicinstitute.org/park-forests>

NPS News Release: [Reducing deer numbers and removing invasive plants are key to long-term forest health - Catoctin Mountain Park \(U.S. National Park Service\) \(nps.gov\)](#)