



Probable Failure of Forest Regeneration Requires Sustained Management in Delaware Water Gap National Recreation Area

Introduction

Forests are a key part of the landscape and visitor experience in eastern parks. These ecosystems are facing many stressors, including non-native plants, invasive tree pests, overabundant deer, and altered fire regimes. These stressors diminish forest resilience, which is 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.

Five NPS Inventory and Monitoring Networks assessed 10 regeneration metrics in 39 parks (Figure 1) containing about 1,500 permanent forest health monitoring plots sampled every four years (2008-2019). Here, we share results for Delaware Water Gap National Recreation Area (DEWA). For more detailed information on the full study, see the source publication in the Resources section below.

Main Findings

On a four-category scale (Secure, Insecure, Probable Failure, and Imminent Failure), DEWA has a forest regeneration status of **Probable Failure** (Figure 2). This means that the park is experiencing regeneration failure as indicated by inadequate and/or decreasing saplings, and low numbers of seedlings. The trends over time in tree, sapling, and seedling abundance by native canopy, subcanopy, and exotics are shown in Figure 3.

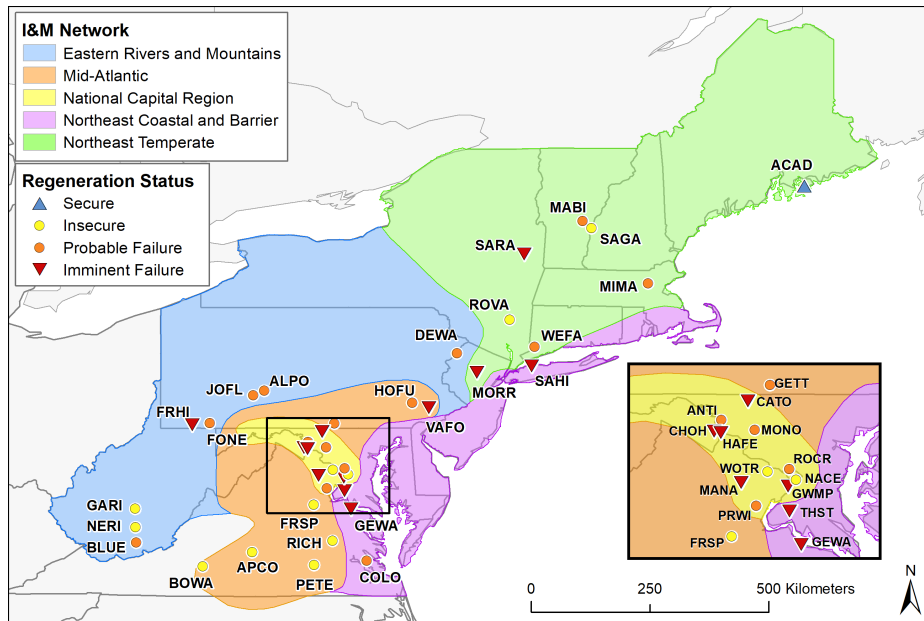


Figure 1. Map of parks included in regional regeneration project and forest regeneration status. Delaware Water Gap National Recreation Area is located in the Eastern Rivers and Mountains (ERMN) Inventory and Monitoring Network.

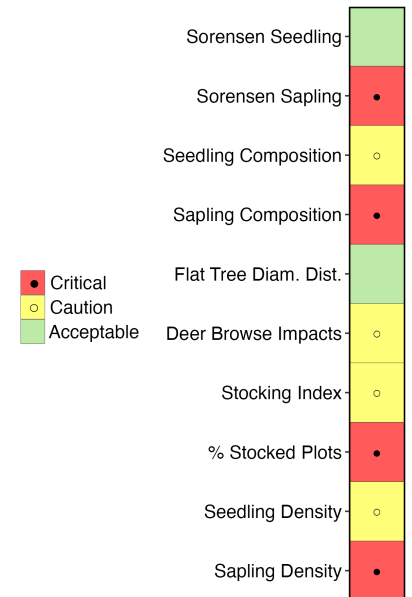


Figure 2. Regeneration status for each of the 10 metrics in Delaware Water Gap National Recreation Area.

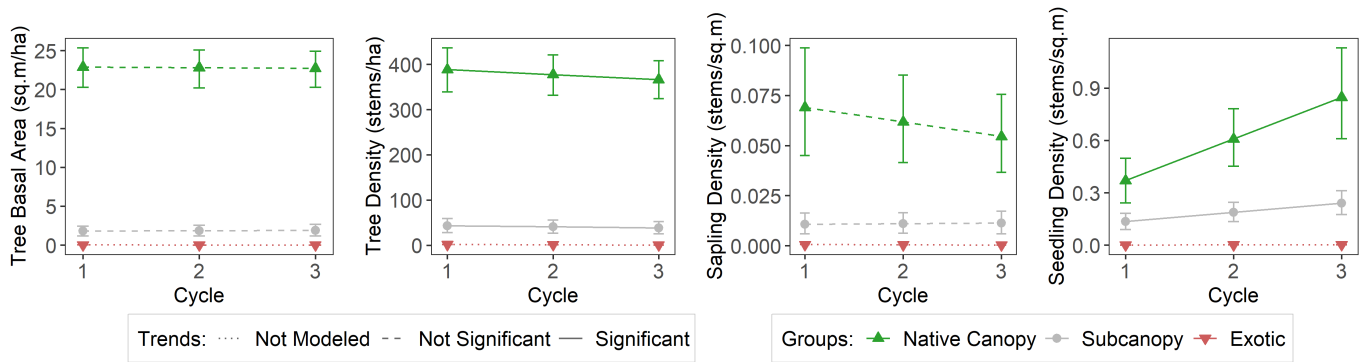


Figure 3. Trends in tree, sapling, and seedling abundance by species group. Trends are based on change over time across three complete survey cycles: Cycle 1 (2008 – 2011), Cycle 2 (2012 – 2015), and Cycle 3 (2016 – 2019).

Management Recommendations

Eastern national parks need a sustained commitment to reducing deer browse impacts, managing invasive plants, and enhancing forest structural complexity and diversity to secure sufficient regeneration and avoid future forest loss. We suggest that managers of DEWA:

- continue to reduce invasive plants through early detection and rapid response, release of approved biological controls, and strategic invasive plant management in high priority habitats.
- assess forest stands at risk or already impacted by pests / pathogens and prioritize invasive plant management in stands where canopy gaps have increased or may soon increase light to the forest floor.
- use prescribed burning in dry, fire-adapted forests to promote canopy tree regeneration.
- promote increased deer hunting within the park through partnerships to protect forest regeneration from browse impacts and maintain ecologically-sustainable deer numbers.

These management efforts are especially important for DEWA as the park is at high risk of losing forest cover without intervention. Conditions are changing rapidly across parks, therefore continued monitoring and reassessment of management actions is necessary to avoid future forest loss in the park. 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.M., Perles, S.J., Schmit, J.P., Matthews, E.R., Weed, A.S., Comiskey, J.A., Marshall, M.R., Nelson, P. and Fisichelli, N. (2023). Overabundant deer and invasive plants drive widespread regeneration debt in eastern United States national parks. *Ecological Applications*. <https://doi.org/10.1002/eap.2837>

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Links:

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

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