



Forest Regeneration 2016

Resource Brief

Importance

Forests make up about three quarters of the landcover in National Capital Region (NCR) parks, and their continued regeneration (the survival of seedlings and saplings to replace large forest trees as they die) is a growing concern.

If the forests of NCR parks were to gradually decline and diminish instead of regenerating, the parks would not only lose part of the distinct character, leafy shade, and cool microclimates that visitors enjoy, but animals and plants of all kinds that depend on the forests would be made vulnerable. From the tiniest, most specialized insects and pollinators, to forest floor salamanders, to flying squirrels and wildflowers, an incredible number of species depend on the forests they live in.

Large white-tailed deer populations ($>8/\text{km}^2$ per Horsley et al. 2003), like the levels found in the NCR, can not only significantly reduce forest regeneration, but can also reduce tree species diversity, density, and the average height of seedlings.

Assessing Regeneration

To assess forest regeneration, we analyzed long-term forest data from the National Capital Region Network, Inventory & Monitoring program (NCRN I&M). We used the number of seedlings and small saplings present, their size, and their distribution to calculate regeneration potential on a plot-by-plot basis with a formula called the “Stocking Index.” (A detailed explanation of stocking index calculation methods is in Schmit and Nortrup 2013)

Results - Low Regeneration Levels

Forest regeneration levels are low [see figure, page 2] throughout National Capital Region parks. The stocking index threshold for healthy forest regeneration requires that 67% of forest plots should be adequately stocked with seedlings and small saplings. No park exceeded 30%.

NCRN forest data show tree seedlings present in all parks. However, where there are large deer populations, the seed-



Measuring the height of a seedling at Catoctin Mountain Park.

Photo: NPS

lings that are present are often those less palatable to deer including species like American beech (*Fagus grandifolia*), paw-paw (*Asimina triloba*), or the invasive tree of heaven (*Ailanthus altissima*).

The overall lack of forest regeneration throughout the National Capital Region remains a cause for concern and stocking index scores have changed very little since 2006-2009. As these low levels of regeneration persist, forests may enter a period of long term decline.

Park Forest Management

Catoctin Mountain Park, Rock Creek Park, Antietam National Battlefield, and Monocacy National Battlefield are all currently reducing their deer populations to help boost forest regeneration. Other NCR parks continue to work through the environmental compliance process to address forest regeneration and health through deer management.

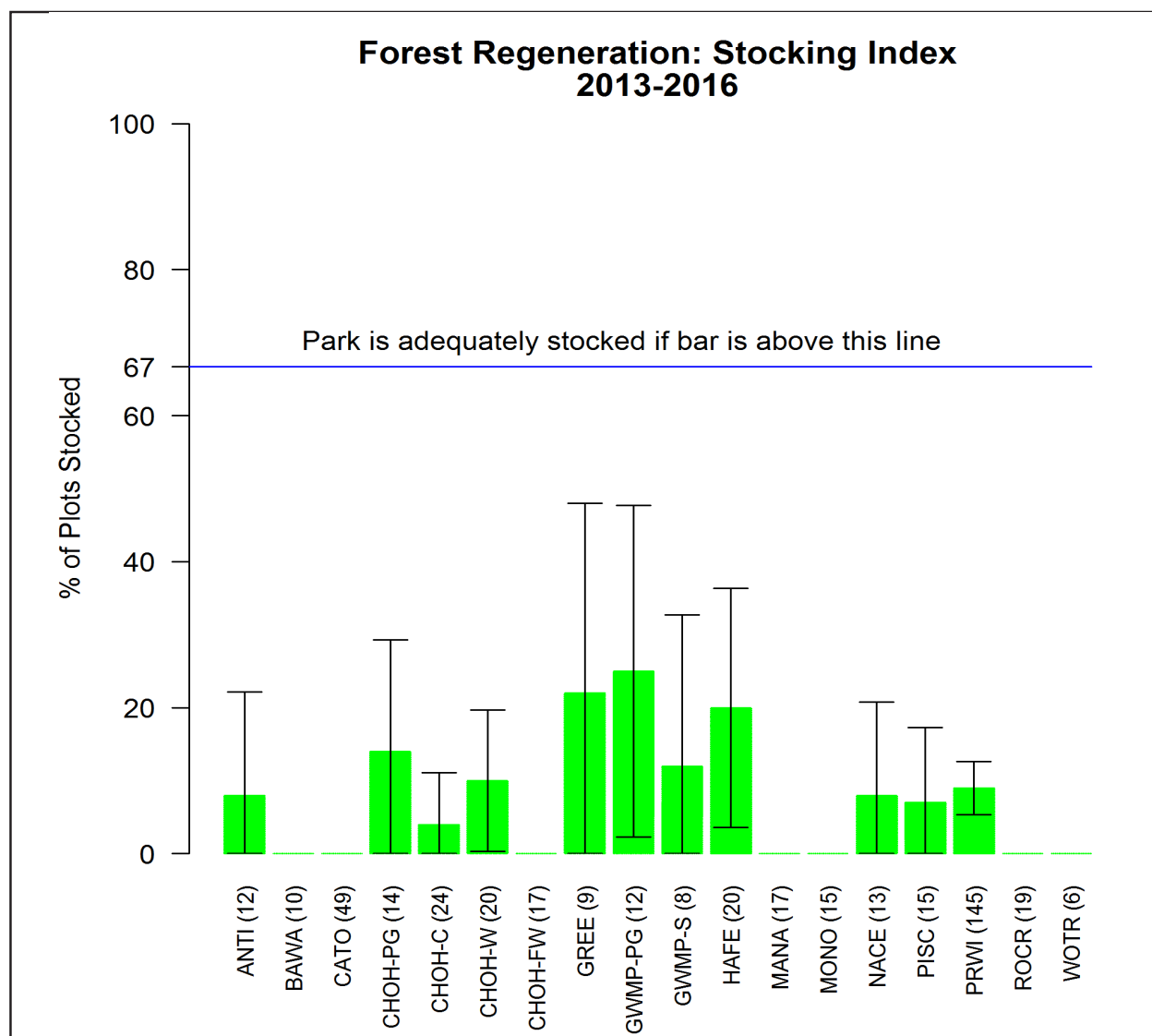
While stocking index scores remain low at Catoctin Mountain Park, the abundance of small seedlings has surged since park deer reductions began in 2009. Seedlings grew from about 630 per hectare (2006-2009) to over 7,600 per hectare (2013-2016). But because the stocking index includes both seedlings and small saplings, and assigns higher values to larger individuals, the increase in seedlings has not yet registered in Catoctin's stocking index score.

Similarly, Rock Creek Park seedling numbers rose from 2,240 per hectare (2006-2009) to 4,250 per hectare (2013-2016). This increase is not yet visible in the stocking index. Rock Creek began deer management in 2013.

No results are in yet for Antietam and Monocacy which began deer management in 2016. An increase in the stocking index for any of the parks pursuing deer management will be an important indicator of the effectiveness of this management.

More Information

Megan Nortrup
Phone: 202-339-8314; Email: megan_nortrup@nps.gov
<http://science.nature.nps.gov/im/units/ncrn>



For a park as a whole to have healthy regenerative capacity, 67% of plots must be adequately stocked (blue line). The horizontal axis shows park abbreviations are followed by the number of NCRN forest monitoring plots in that park in parenthesis. T-shaped error bars indicate 95% confidence intervals for the percent of plots with adequate regeneration levels.

Park Abbreviations

ANTI = Antietam National Battlefield
BAWA = Baltimore–Washington Parkway
CATO = Catocin Mountain Park
CHOH-C = Central part of C&O Canal National Historical Park from Violette's Lock to Harpers Ferry
CHOH-PG = Potomac Gorge managed by C&O Canal
CHOH-W = Western C&O Canal from Harpers Ferry to Four Locks
CHOH-FW = Far western C&O Canal from upstream of Four Locks to Cumberland
GREE = Greenbelt Park

GWMP-PG = Potomac Gorge managed by George Washington Memorial Parkway
GWMP-S = George Washington Memorial Parkway south of Key Bridge
HAFE = Harpers Ferry National Historical Park
MANA = Manassas National Battlefield Park
MONO = Monocacy National Battlefield
NACE = DC portion of National Capital Parks - East
PISC = Piscataway and Fort Washington Parks
PRWI = Prince William Forest Park
ROCR = Rock Creek Park
WOTR = Wolf Trap National Park for the Performing Arts

Citations: Horsley, S.B., S.L. Stout, and D.S. DeCalesta. 2003. White-tailed deer impact on the vegetation dynamics of a northern hardwood forest. *Ecological Applications* 13:98-118.

Schmit, J.P. and M. Nortrup. 2013. NCRN Resource Brief: Forest Regeneration 2013. <https://irma.nps.gov/DataStore/Reference/Profile/2205449>.