South Mountain Reservation
Forest Regeneration Site
Evaluation Report
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Executive Summary

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Executive Summary
This report provides results of an evaluation of forest regeneration sites, fenced exclosures planted with native species in 2009, located in the South Mountain Reservation performed from September 24 through October 2, 2014. In 2009, a total of 41 sites were installed across the Reservation. Sites range in size from 0.12 to 0.87 acres – the total area for all sites is 10.9 acres. In addition, the 14-acre "Preserve" exclosure located off Crest Drive was subject to a rapid evaluation. The evaluation included the following:
1) Site Structures (condition of fencing, gates and locks),
2) Broad Vegetation Cover by Strata (visual estimation of vegetation cover for the herbaceous layer, all woody plants within the deer browse zone, tree seedlings greater than two feet tall, sub-canopy and canopy),
3) Restoration Plantings and Natural Recruitment (approximate quantity of each species utilized for restoration plantings was recorded for each exclosure along with quantifying all naturally occurring native herbaceous species, presence of other non-planted native woody shrubs and trees were recorded, but not quantified by the number of individuals present), and
4) Invasive Species (cover of each invasive species was recorded separately based upon approximate overall cover within each exclosure.

The key findings of the evaluation include:
1) The majority of sites remain effective in excluding deer, however, four are severely damaged and non-functional and subject plantings to deer browsing. Five sites require repair and six sites cannot be accessed due to jammed locks from the settling of gates.

2) Native cover was relatively low, but was consistently higher within sites. This applied to herbaceous and woody species. Non-native cover was more consistent across the exclosure boundary. Non-native cover was somewhat 'bi-modal', with some areas having very low cover to other areas with high cover (typically associated with greater light resources).

3) Restoration planting success was mixed. A total of sixty species were planted. There were no observed individuals for 35% of planted species. Approximately 33% of species were found in > 75% of the sites where they were planted. When present, planted species had fewer individuals than the amount planted with several exceptions (e.g., white wood aster). **There was no evidence of planted species spreading beyond the sites. Natural recruitment of native species within sites was relatively diverse (74 native species recorded).** Some of these species are found outside of sites and appear to be at least partially deer tolerant (e.g., Beech drops), but most are absent or found in poor condition outside of sites (e.g., White wood aster, Black gum).

4) There were 25 invasive species found within regeneration sites. A total of ten species are considered to have high control priority (e.g., Oriental photinia). Due to the protection of the sites, overall, the invasive woody shrubs within sites have a slightly greater density than the immediate outside environments.
The fundamental objectives of the regeneration program were to: 1) establish through restoration planting a stable, diverse population of native species to serve as a seed source for regeneration in the Reservation as a whole; and 2)

promote a slow migration of these native plants over a 20-plus year period beyond these sites. Based on this study, the first objective, the establishment of native species, has been moderately successful: though there are clear losses of some planted species, there has been some natural recruitment of other native species. There has also been a proliferation of some invasive species in several sites. As for the second objective, there is no evidence that native species have spread beyond the confines of the individual sites. This is in great part due to a population of white tailed deer, despite annual culling, has not been reduced significantly below 20 per square mile, a level twice the density required for regeneration of a forest such as the Reservation with a depleted understory. ii

In light of these overall objectives and the results of this evaluation, five recommendations with ten associated goals are provided to assure the success of the project (See "Summary of Recommendations and Goals" on the next page).
The key goal of the regeneration site program*, that they serve as seed sources to ultimately restore forest health across the entire Reservation*, cannot be met unless the deer population is further reduced. It is likely that the target deer population density should be 10 per square mile or less. (This recommendation is supported by Dan Bernier, the Union County deer management expert advising Essex County in his annual culling reports. According to those reports, currently the deer density is almost twice that level.) ***However, the guiding principle should not be a target deer density. Rather, the target should be measures of vegetation that reflect continuing improvement and ultimately meeting thresholds that would define a healthy forest.*** Forest health monitoring using the 'Sentinel Seedling' and 'Forest Secchi' protocols have been performed twice at the Reservation. In 2007/2008, 82% of planted oak seedlings were browsed by deer. In 2012/2013, this number had dropped to 35%. The ultimate goal is 10% browse levels. Improvements were also seen in the cover of native woody plants within the browse zone (2008: 10%; 2013: 30%). The ultimate goal is 70% cover. iii

Summary of Recommendations and Goals

There are five recommendations and ten associated goals. See report for additional details.

Recommendation #1: Continue to Reduce Deer Herd Population Size

Goal #1-1: **Utilize Forest Health Monitoring Program Goals to Set Deer Harvest Goals**

• Data collected for this report suggest that the current deer population continues to severely degrade forest health across the Reservation.

- The deer herd size should be reduced until Sentinel Seedling Protocol goals (< 10% browse on planted seedlings) and Forest Secchi Protocol goals (> 70% native woody cover in the browse zone) are met and then annual culling necessary to maintain that reduced herd size.

Recommendation #2: Perform Regular Regeneration Site Fencing Inspection and Repair

Goal #2-1: **Repair existing breaches in regeneration sites**

• There are currently four ineffective sites with severe fence damage. Five additional sites have moderate damage and six additional sites have access issues due to problems with locks.

Goal #2-2: **Implement Inspection and Repair Schedule**

• Inspections and repairs should occur bi-annually (spring and fall).

Recommendation #3: Perform Strategic Invasive Species Control

Goal #3-1: **Eradicate All Emerging Invasive Species Within and Immediately Adjacent to Sites**

• See Table 4 and Appendix A for a list of emerging invasive species and their abundance within sites. Key species include Chinese silvergrass and Callery pear.

Goal #3-2: Selectively Control Widespread Invasive SpeciesWithin and Immediately Adjacent to Sites

• See Table 4 and Appendix A for a list of emerging invasive species and their abundance within sites. Key species include Japanese knotweed and Japanese honeysuckle.

Goal #3-3: **Develop comprehensive annual program to reduce the most highly threatening invasive species across the entire Reservation**

• The most threatening species threaten short- and long-term forest health across the entire Reservation. Key species include Oriental Photinia, Siebold's Viburnum, Linden Viburnum, Winged euonymus and Japanese Aralia.

Recommendation #4: Develop a Plan for Additional Restoration Plantings

Goal #4-1: **Install selected herbaceous and shrub species with high likelihood of establishment**

• Key species with high potential to survive and spread (following successful implementation of Recommendation #1) include: Maple-leaved viburnum, Spicebush, Bluestem goldenrod, Marginal woodfern, Solomon's seal and False Solomon's seal

• A specific plan should be devised to determine the exact number and location of plantings.

Goal #4-2: **Re-install selected native wildflower species that failed to establish during the initial restoration**

• Key species include Bloodroot, Wild ginger, Wood geranium, Rue anemone, Bellwort, Jack-in-the-pulpit and violet species

• A specific plan should be devised to determine the exact number and location of plantings.

Recommendation #5: Perform Regular Exclosure Surveys and Reservation-wide Ecological Monitoring

Goal #5-1: **Perform regular site plant surveys to track progress**

• Repeat surveys every three years for the next nine years (2017, 2020, 2023) using the methods described in this report. Maintenance of sites should not be necessary beyond 2023.

Goal #5-2: **Perform regular forest health monitoring throughout the Reservation**

• Repeat Sentinel Seedling and Forest Secchi protocols every three years (2016, 2019, 2021 and beyond) to monitor progress of the deer management program.