

South Mountain Reservation Forest Regeneration Site Evaluation Report

Ecological **ES** Solutions

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Recovering
Pinxter Azalea

Presentation Summary

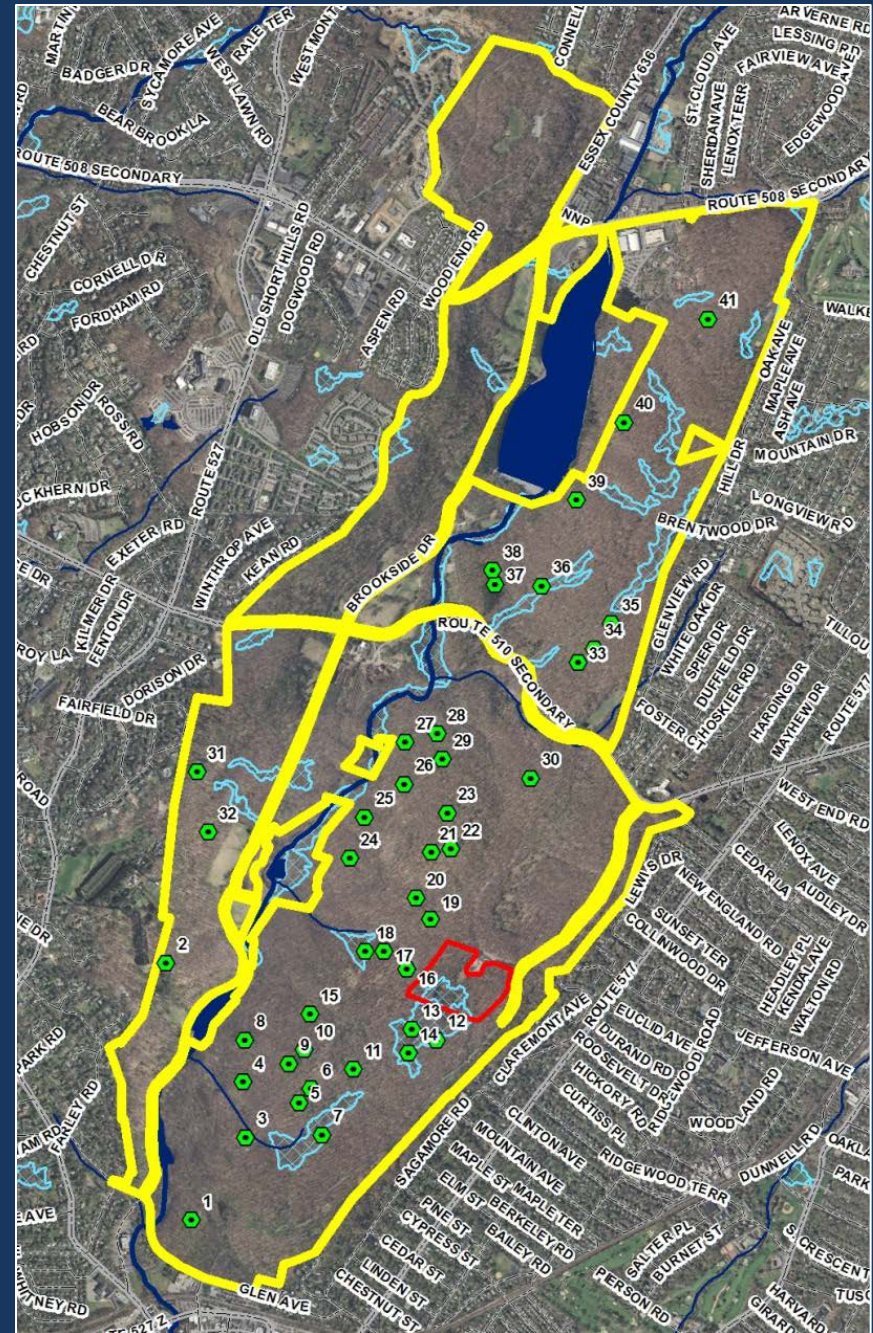
- Regeneration Program Objectives
- Regeneration Sites and Plantings – 2009
- Project Evaluation - 2014
 - Methods
 - Results
 - Recommendations

Regeneration Program Objectives

- “Promote slow migration of planted native species beyond sites”
 - **Ultimately, restore forest health across entire Reservation**
- *Continue deer management program*
 - *To allow spread of plantings from sites and facilitate natural regeneration*

Regeneration Sites and Plantings - 2009

- Regeneration Site Summary
 - 41 sites
 - Size Range: 0.12 to 0.87 acres
 - Existing “Preserve” enclosure: 14 acres
- Install native wildflowers, grasses, shrubs & trees
 - 60 species: 33 herbaceous, 9 shrubs, 18 trees
 - Approximately 19,000 individual plants



Project Evaluation - 2014

- **Methods**

- 1) **Regeneration Site Structures**

- Evaluate existing status/damage of fencing, gates and locks

- 2) **Broad Vegetation Cover by Strata / Vegetation Layer**

- Visual estimation by cover classes (e.g., 1-10%; 75-100%)
 - Separate values for herbaceous layer, all woody plants within the browse zone, tree seedlings > 2' tall, sub-canopy, canopy
 - Performed within and immediately adjacent to fenced regeneration sites
 - Above was recorded separately for native and non-native species

- 3) **Restoration Plantings and Natural Recruitment**

- Visual estimation for each species utilized in regeneration plantings and all other naturally occurring herbaceous species
 - Quantity categories (e.g., 0, 6-10, 51-75, > 250)
 - Presence / Absence recorded for non-planted woody species

- 4) **Invasive Species**

- Visual estimation for each species cover class (e.g., 1-10%; 75-100%)
 - Performed within regeneration sites only
 - Overall non-native cover was recorded in #2 above

Project Evaluation - 2014

- Results - Regeneration Site Structures
 - 26 of 41 sites are in good condition
 - 4 sites non-functional (2, 36, 38, 41)
 - 5 sites with minor to moderate damage to fencing
 - 6 sites have lock issues due to settling of gates

ID Number	ID Code	Acres	Damage Category	Current Deer Accessibility	Damage Description
2	EL1	0.37	Severe	High	Multiple, large breaches from tree falls
3	SS1	0.12	Lock Only	None	Lock is stuck/wedged
4	LE4	0.27	Minor	None	Repair required in one location (top of fence)
15	LE9	0.12	Moderate	None	Fence damaged in one location
21	LE17	0.98	Lock Only	None	Lock is missing
22	LE16	0.13	Minor	None	Fence damaged at gate
28	BB5	0.12	Lock Only	None	Lock combination does not work
30	OV2	0.48	Lock Only	None	Lock is stuck/wedged
31	EL3	0.12	Moderate	None	Gate held with rope and several repaired breaches
34	LG3	0.65	Lock Only	None	Lock is stuck/wedged
36	HS1	0.32	Severe	High	Multiple, large breaches from tree falls; Gate destroyed
37	LE22	0.30	Minor	None	Existing temporary repairs should be made permanent
38	LE24	0.87	Severe	High	Multiple, large breaches from tree falls
39	RT9	0.35	Lock Only	None	Lock is stuck/wedged
41	TB3	0.36	Severe	High	Single, large breach from tree fall; Lock is stuck/wedged

Project Evaluation - 2014

- Results - Broad Vegetation Cover by Strata
 - Tree Canopy: About 80% with >75% or 51-75% cover
 - Sub-Canopy: About 80% with < 50% cover
 - Nearly all tree canopy and sub-canopy cover is native species.

		Cover Category						
Strata	Position	Absent	< 1%	1-10%	11-25%	26-50%	51-75%	>75%
Canopy	Inside	0	0	0	2	17	29	51
	Outside	0	0	0	2	17	29	51
Sub-Canopy	Inside	0	0	5	37	34	22	2
	Outside	0	0	5	37	34	22	2
Native Herbs	Inside	0	10	41	24	15	5	5
	Outside	0	46	37	2	7	5	2
Native Woody Species (browse zone)	Inside	0	2	22	39	32	5	0
	Outside	2	39	51	5	0	2	0
Native Tree Regeneration Only (> 2 ft. tall)	Inside	2	5	27	41	20	5	0
	Outside	10	41	49	0	0	0	0
Non-Native Herbs	Inside	17	20	17	15	7	12	12
	Outside	15	15	17	15	15	12	12
Non-Native Woody Species (browse zone)	Inside	12	29	27	15	7	10	0
	Outside	17	24	32	12	5	10	0
Non-Native Tree Regeneration Only (> 2 ft. tall)	Inside	54	20	22	5	0	0	0
	Outside	59	17	15	7	2	0	0

Project Evaluation - 2014

- Results - Broad Vegetation Cover by Strata
 - Native Herbs
 - Regeneration Sites – 49% of sites with > 11% cover
 - Adjacent Areas – 16% of areas with > 11% cover (and only deer resistant species)
 - Non-native Herbs
 - Regeneration Sites – 46% of sites with > 11% cover
 - Adjacent Areas – 54% of areas with > 11% cover

		Cover Category						
Strata	Position	Absent	< 1%	1-10%	11-25%	26-50%	51-75%	>75%
Canopy	Inside	0	0	0	2	17	29	51
	Outside	0	0	0	2	17	29	51
Sub-Canopy	Inside	0	0	5	37	34	22	2
	Outside	0	0	5	37	34	22	2
Native Herbs	Inside	0	10	41	24	15	5	5
	Outside	0	46	37	2	7	5	2
Native Woody Species (browse zone)	Inside	0	2	22	39	32	5	0
	Outside	2	39	51	5	0	2	0
Native Tree Regeneration Only (> 2 ft. tall)	Inside	2	5	27	41	20	5	0
	Outside	10	41	49	0	0	0	0
Non-Native Herbs	Inside	17	20	17	15	7	12	12
	Outside	15	15	17	15	15	12	12
Non-Native Woody Species (browse zone)	Inside	12	29	27	15	7	10	0
	Outside	17	24	32	12	5	10	0
Non-Native Tree Regeneration Only (> 2 ft. tall)	Inside	54	20	22	5	0	0	0
	Outside	59	17	15	7	2	0	0

Project Evaluation - 2014

- Results - Broad Vegetation Cover by Strata
 - Native Woody Species in Browse Zone
 - Regeneration Sites – 76% of sites with > 11% cover
 - Adjacent Areas – 7% of areas with > 11% cover (and only deer resistant species)
 - Non-native Woody Species in Browse Zone
 - Regeneration Sites – 32% of sites with > 11% cover
 - Adjacent Areas – 27% of areas with > 11% cover

		Cover Category						
Strata	Position	Absent	< 1%	1-10%	11-25%	26-50%	51-75%	>75%
Canopy	Inside	0	0	0	2	17	29	51
	Outside	0	0	0	2	17	29	51
Sub-Canopy	Inside	0	0	5	37	34	22	2
	Outside	0	0	5	37	34	22	2
Native Herbs	Inside	0	10	41	24	15	5	5
	Outside	0	46	37	2	7	5	2
Native Woody Species (browse zone)	Inside	0	2	22	39	32	5	0
	Outside	2	39	51	5	0	2	0
Native Tree Regeneration Only (> 2 ft. tall)	Inside	2	5	27	41	20	5	0
	Outside	10	41	49	0	0	0	0
Non-Native Herbs	Inside	17	20	17	15	7	12	12
	Outside	15	15	17	15	15	12	12
Non-Native Woody Species (browse zone)	Inside	12	29	27	15	7	10	0
	Outside	17	24	32	12	5	10	0
Non-Native Tree Regeneration Only (> 2 ft. tall)	Inside	54	20	22	5	0	0	0
	Outside	59	17	15	7	2	0	0

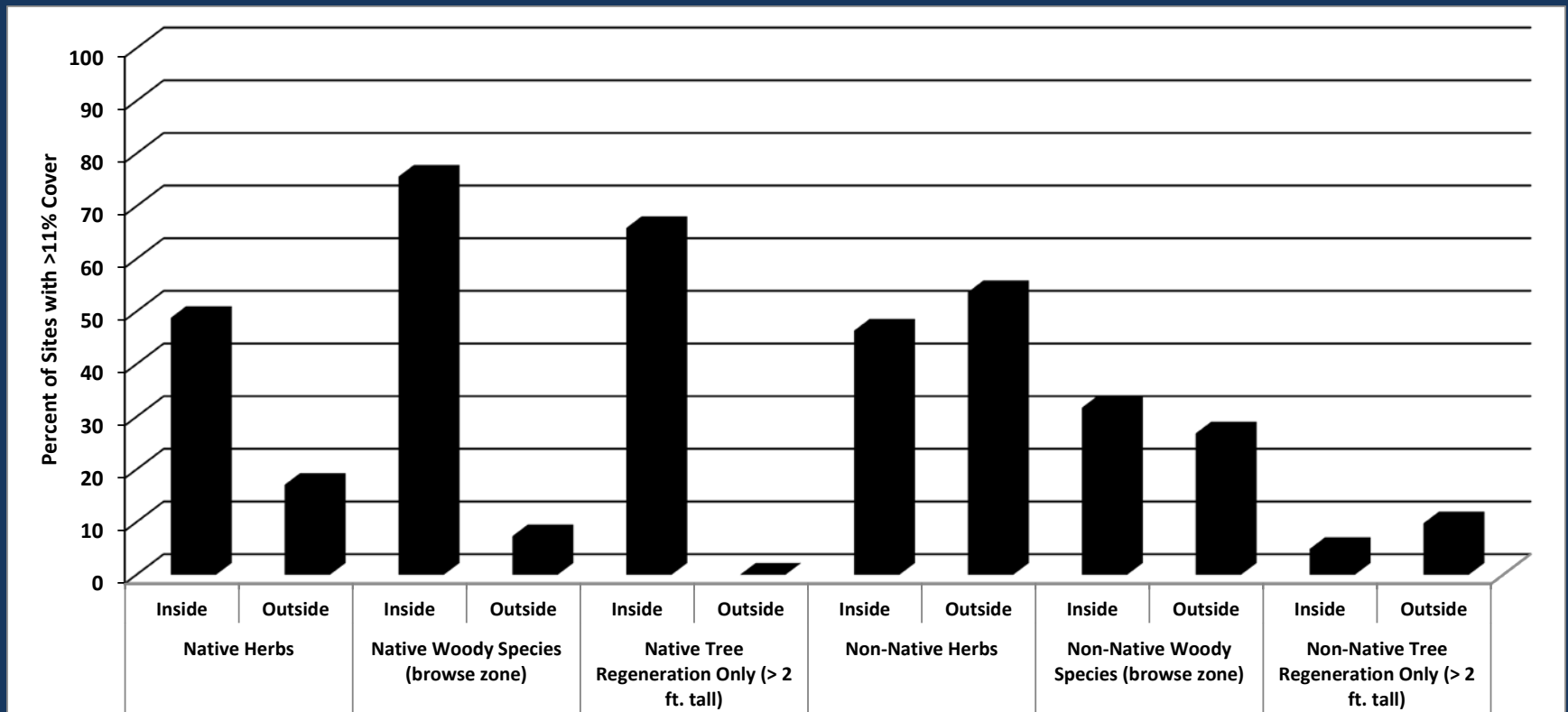
Project Evaluation - 2014

- Results - Broad Vegetation Cover by Strata
 - Native Tree Regeneration (> 2' tall)
 - Regeneration Sites – 66% of sites with > 11% cover
 - Adjacent Areas – 0% of areas with > 11% cover (and only deer resistant species)
 - Non-native Tree Regeneration (> 2' tall)
 - Regeneration Sites – 5% of sites with > 11% cover
 - Adjacent Areas – 9% of areas with > 11% cover

		Cover Category						
Strata	Position	Absent	< 1%	1-10%	11-25%	26-50%	51-75%	>75%
Canopy	Inside	0	0	0	2	17	29	51
	Outside	0	0	0	2	17	29	51
Sub-Canopy	Inside	0	0	5	37	34	22	2
	Outside	0	0	5	37	34	22	2
Native Herbs	Inside	0	10	41	24	15	5	5
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Non-Native Herbs	Inside	17	20	17	15	7	12	12
	Outside	15	15	17	15	15	12	12
Non-Native Woody Species (browse zone)	Inside	12	29	27	15	7	10	0
	Outside	17	24	32	12	5	10	0
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Project Evaluation - 2014

- Percentage of Regeneration Sites with >11% Cover by Vegetative Strata



Project Evaluation - 2014

- Results - Restoration Plantings

- All species

- 35% (21 species) had no observed survivors
 - 15% (9 species) had some survival in 25-50% of sites
 - 12% (7 species) had some survival in 50-75% of sites
 - 33% (20 species) had some survival in > 75% of sites

- Herbaceous Species

- 52% (17 species) had no observed survivors
 - Species present in > 75% of sites included Christmas Fern, Partridge-berry, White Wood Aster, Pennsylvania Sedge, Zig-zag Goldenrod
 - Most species were present in numbers lower than that planted – species that increased above planting levels included New York Fern, Zig-zag Goldenrod, White Wood Aster, Pennsylvania Sedge (occasionally included Solomon's Seal and False Solomon's Seal)

- Woody Species

- 15% (4 species) had no observed survivors
 - Species present in > 75% of sites included Sassafras, White Ash, Lowbush Blueberry, Tuliptree, Spicebush, Ironwood, Witch-hazel, Chestnut Oak, White Pine, Highbush Blueberry, Mountain Laurel, Northern Red Oak, Blackhaw, Red Maple, Sugar Maple, Wild Black Cherry

Project Evaluation - 2014

- Results - Natural Recruitment

Species found inside of sites

- 74 native species
 - 43 herbaceous, 13 shrubs, 18 trees
- 10 most common native species
 - Witch-hazel, Allegheny Blackberry, Black Gum, Beech Drops, Black Birch, Partridge-berry, Tuliptree, White Ash, Wild Black Cherry, White Wood Aster
- **Woody species >>> Herbaceous species**
 - **Probably due to lack of nearby herbaceous seed sources**

Species found outside of sites

- Primarily deer tolerant
 - Examples include Beech Drops, Pennsylvania Sedge, Marsh Fern
- Deer Susceptible species found in poor condition / heavily browsed
 - Examples include White Wood Aster, Black Gum

Project Evaluation - 2014

- Results - Invasive Species
 - 25 species detected
 - 10 species considered to have “high control priority” within sites
 - Tree-of-Heaven, Japanese Aralia, Winged Euonymus, English Ivy, Toringo Crabapple, Chinese Silvergrass, Oriental Photinia, Japanese Knotweed, Callery Pear, Linden Viburnum
 - Locations provided in Appendix
 - All emerging invasive species are considered to have “high control priority” across the entire reservation
 - Species of greatest concern include:
 - **Oriental Photinia**
 - Japanese Aralia
 - Winged Euonymus
 - Toringo Crabapple
 - English Ivy
 - Callery Pear
 - Chinese Silvergrass

Recommendations

- Recommendation #1
Continue to Reduce Deer Herd Population Size
- Recommendation #2
Perform Regular Exclosure Fencing Inspection and Repair
- Recommendation #3
Perform Strategic Invasive Species Control
- Recommendation #4
Consider Additional Restoration Plantings
- Recommendation #5
Perform Regular Exclosure Surveys and Reservation-wide Ecological Monitoring

Recommendations

- Recommendation #1

- Continue to Reduce Deer Herd Population Size

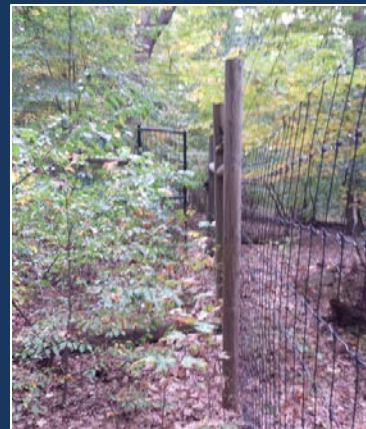
- Utilize current vegetation monitoring methods

- Sentinel Seedling: 2008 = 82% browse; 2013 = 35% browse
 - Goal is 10% browse.

- Forest Secchi: 2008 = 10% native cover; 2013 = 30% native cover
 - Goal is 70% native cover

- For deer population density...

- Goal is 10 deer per square mile, but vegetation goals above are more important



Recommendations

- Recommendation #2

- Perform Regular Exclosure Fencing Inspection and Repair

- Repair existing issues
 - Four sites have severe damage
 - Five sites have minor / moderate damage
 - Six sites have access issues due to wedged locks
 - Implement spring/fall inspection and repair schedule

Recommendations

- Recommendation #3

Perform Strategic Invasive Species Control

- Eradicate all emerging species within and near sites
- Selectively control widespread species within and near sites
- Develop comprehensive annual program to control highly threatening invasive species
 - There is an urgent need to selectively control particular species throughout the Reservation!!
 - See report text for details

Recommendations

- Recommendation #4

Consider Additional Restoration Plantings

- Install selected herbaceous and shrub species with high likelihood of establishment
 - Candidate / 'Backbone' species include Maple-leaved Viburnum, Spicebush, Bluestem Goldenrod, Marginal Woodfern, Solomon's Seal, False Solomon's Seal
- Re-install selected native wildflower species that failed to establish during the initial planting
 - Candidate species include Bloodroot, Wild Ginger, Wood Geranium, Rue Anemone, Bellwort, Jack-in-the-Pulpit, Violet species
 - These species should be common, but their plantings largely failed.

Recommendations

- Recommendation #5

- Perform Regular Exclosure Surveys and Reservation-wide Ecological Monitoring

- Perform regular site plant surveys to track progress
 - Repeat regeneration site surveys (2017, 2020, 2023)
 - Perform regular forest health monitoring throughout the Reservation
 - Repeat Sentinel Seedling / Forest Secchi (2016, 2019, 2021)