Ward Acres

Natural Resources Management Plan

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1. Introduction

Ward Acres is a 62-acre park located in New Rochelle, New York. It is owned and operated by the City of New Rochelle Parks and Recreation Department. Located in suburban Westchester County, Ward Acres sees much usage from the public, requiring the need of a Natural Resource Management Plan to best provide for the inhabitants of the City and surrounding areas.

A Master Plan was undertaken in 2006 to address the future of Ward Acres Park. Many partners were involved, and the following Natural Resource Management Plan takes the conclusions into consideration.

The City of New Rochelle Parks and Recreation mission statement is as follows:

The Department of Parks and Recreation provides a wide variety of recreational opportunities for all ages and abilities by managing parks, playgrounds, community centers, beaches, athletic fields, a marina and other open spaces to improve the quality of life for all residents of New Rochelle.

1.1. Objectives

The objectives of the natural resource management plan are to:

- Identify and inventory ecological communities, animals, plants, and significant habitats within Ward Acres Park in New Rochelle, New York.
- Summarize the natural and cultural resource values of Ward Acres.
- Analyze the significance of natural resource management needs and rank them in importance.
- Propose specific actions, including funding and staffing requirements for dealing with the most important issues.
- Present a multi-year program to achieve measurable progress in accomplishing the proposed actions.
- Identify needed scientific research leading to appropriate management actions.
- Provide the forum for an interdisciplinary approach to the park's natural and cultural resource management and maintenance issues.

2. Ward Acres

Purchase by New Rochelle in 1962, Ward Acres is a 62-acre park located in New Rochelle, New York. It is bordered on all sides by city roads which include Quaker Ridge Road, Pinebrook Boulevard, and Broadfield Road. Two (2) main buildings remain standing on the park property: a Barn accessed from Quaker Ridge Road; and a Farm House accessed from Pinebrook Boulevard. There is vehicle access to the park at both of these locations, with small gravel and paved parking lots. There are at least 7 other walk-in access points which lead directly onto the trail system.

2.1. Resource Description

Ward Acres is a unique island of diversity located in a developed suburban area. While there is an abundance of invasive species in sections of the park, there exist old growth forests with very little invasive cover. Due to the history of the park the forested areas, particularly the northern forested area, have a very well developed canopy and a rich understory. The many fields are highly covered with invasive species growth, as will be discussed later. While sections of the Natural Resource Management Plan have listed some of the species present, a biodiversity list can be found as Appendix A.

2.2. History of Ward Acres

(Excerpted from the Master Plan, Vollmer, 2006)

2.2.1. Hillanddale Farms

The 62 acres that is now known as Ward Acres Park was originally part of a nearly 500-acre estate owned by Watson Dickerman. A renowned breeder, he oversaw the construction of the Barn, stone walls and Forge which still exist on the property today. The horse graveyard located along the eastern boundary was begun during his ownership of the property, and includes one of his most famous sires, Bellini. After his death in 1923 his wife Florence sold off a piece of the estate to the Ward Family in 1925. (Excerpted from Vollmer, 2006)

2.2.2. Ward Acres Farm

In 1925 William B. Ward, son of Robert B. Ward and president of the Ward Baking Corporation and Ward Bread Company, purchased part of the Hillanddale property from Florence Dickerman to increase the size of the family plot to approximately 100 acres. The barns were used little until renovations began in 1945 as horse breeding and training activities resumed on the site. The 1950's saw a period of the land being sold for development, as well as a donation of a parcel of land to the city of New Rochelle for the William B. Ward School. The 62 acres now know as

Ward Acres was purchased by the City of New Rochelle in 1962. (Excerpted from Vollmer, 2006)

2.2.3. Ward Acres Park

The property currently known as Ward Acres was purchased by the City of New Rochelle in 1962 with help from the New York State Park and Recreation Land Acquisition Bond Act. The Act states that "Lands acquired… shall consist of predominantly open or natural lands…." and that "A municipality… may establish reasonable rules and regulations to insure proper administration and development of such lands…." While the park has mainly seen passive recreation since its inception, there have been a number of events held on the grounds including but not limited to: The New Rochelle Country Fair; The Wildcliff Arts Center; and the annual Haunted House in the Barn. (Vollmer, 2006)

2.3. Geology and Soils of Ward Acres

There are 6 associated soil types in the park, as listed in the USDA's *Soil Survey of Putnam and Westchester Counties, NY* (USDA, 1994). They are as follows, with approximate percentage cover:

85% of Park:

CrC - Charlton-Chatfield complex, rolling, very rocky

7% of Park:

RdB - Ridgebury loam, 3-8% slopes

Less than 5% of Park:

CsD - Chatfield-Charlton complex, hilly, very rocky
Ub - Udorthents, smoothed (Ward Acres School area only)
UpB - Urban land – Paxton complex, 2-8% slopes (southern edge, western side)
UlC - Urban land – Charlton-Chatfield complex, rolling, very rocky (southern edge, eastern side)

The predominant soil type in Ward Acres, the Charlton – Chatfield complex, is also the predominant soil of Westchester County, covering more than 44,000 acres county-wide (approximately 14.5% of Westchester County). This complex is typified by well drained soil on hilltops and hillsides of gentle slope which have shallow bedrock (about 20 - 40" deep). The complex usually includes large numbers of bedrock, boulders, or other exposed erratics.

The CrC soil type is not listed as suitable for cropland, but as "fair" in possible sustainability for native and ornamental trees, shrubs and ground cover. Many of these associated species exist within the park, as seen in the Biodiversity list (Appendix A).

3. Natural Communities of Ward Acres

Classification from Reschke 1990:

III. Riverine System

A. Riverine

6. Intermittent Stream

B. Riverine Cultural

3. Ditch / Artificial Intermittent Stream

V. Palustrine System

C. Forested Mineral Soil Wetlands

1. Floodplain Forest

E. Palustrine Cultural

4. Reed Grass / Purple Loosestrife Marsh

VI. Terrestrial System

A. Open Uplands

22. Successional Old Field

23. Successional Shrubland

C. Forested Uplands

8. Oak-Tulip Tree Forest

21. Successional Southern Hardwood Forest

D. Terrestrial Cultural

12. Mowed Lawn

13. Mowed Roadside / Pathway

3.1. The Forests of Ward Acres

For the purpose of this Natural Resource Management Plan, the forested areas will be divided into four (4) parcels, as they are distinct from each other in general characteristics and species presence. They are marked on Map 1. For discussion, they will be broken into: North Woods, Northwest Woods, Central Woods, and the Southeast Woods.

3.1.1. North Woods

This is by far the most pristine wooded area in the park. It is defined as the area from the northernmost entrance, leading to the northernmost Broadfield Road entrance. (See Map 1) There is an intermittent stream which runs in a northeast direction flowing off of a culvert from Broadfield Road. A series of trails forms the southern border of this wooded area. It is distinct from the central woods area due to the low-lying nature, and the dominance of the Oak and Tulip trees.

This area of forest has been defined as an Oak-Tulip Tree Forest (Reschke, 1990). The dominant species of tree in this area are Tulip (*Liriodendron tulipifera*) and Red Maple (*Acer rubrum*). Other common canopy species present include:

Shagbark Hickory	*Carya ovata*
Red Oak	*Quercus rubra*
Black Oak	*Quercus velutina*
Sweetgum	*Liquidambar sytraciflua*

The dominant understory species is Spicebush (*Lindera benzoin*). There is also a large presence of saplings.

There is much ground cover, with patches of various species. Some of the most common flora includes:

Pachysandra	*Pachysandra terminalis*
Golden Alexanders	*Zizia aurea*
Solomon Seal	*Polygonatum biflorum*
Tall Meadow Rue	*Thalictrum pubescens*
Lady Fern	*Athyrium asplenioides*

While there are very few invasive species in this section, areas of high invasive concentration do exist. There is a small field in the western area of the North Woods, where native trees are not present; it is instead dominated by Japanese Knotweed (*Polygonum cuspidatum*) and Porcelain Berry (*Ampelopsis brevipedunculata*).

A second area with increased invasive cover is on the blue trail as it approaches Pinebrook Boulevard from the west. Here the dominant species are Multiflora Rose (*Rosa multiflora*) and Porcelain Berry (*Ampelopsis brevipedunculata*).

At the southern end of the section, there exists a Reed Grass/Purple Loosestrife Marsh, which will be discussed in the management recommendations section. (Section 5) This area is located between the North Woods and Central Woods segments of the park.

3.1.2. Southwest Woods

The Southwest Woods is the area in the far southwest corner of the park, near the Ward Acres elementary school. It is a young forest, defined as Southern Successional Hardwood due to the presence of pioneer tree species and remaining field species. Shrub species include Pokeweed (*Phytolacca americana*) and Honeysuckle (*Lonicera sp.*), which are fairly common through the area. The section is colonized by trees such as Devil's Walking Stick (*Aralia spinosa*), White Mulberry (*Morus alba*), Black Cherry (*Prunus serotina*), and Black Locust (*Robinia pseudoacacia*). While pioneer species are currently dominant in the area, some canopy trees are beginning to emerge. These include Norway Maple (*Acer platanoides*) and Bitternut Hickory (*Carya cordiformis*).

This area is successional in nature, lending to a very diverse grouping of species. Given the relative age of the wooded area and its proximity to road edges, invasion by alien species is expected. These include Multiflora Rose (*Rosa multiflora*) and Garlic Mustard (*Alliaria petiolata*).

The presence of Jewelweed (*Impatiens capensis*) suggests seasonally moist soils.

3.1.3. Southeast Woods

The Southeast Woods is defined as the area along the White Trail, to the south of the farm house. It leads most of the way to the barn area and can be seen labeled as "SE" in Map 1.

This area is broadly defined as being an Oak-Tulip Tree Forest. Dominant canopy trees include Tulip (*Liriodendron tulipifera*), Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), and Red Maple (*Acer rubrum*). There is also presence of pioneer species such as Black Birch (*Betula lenta*) and Black Cherry (*Prunus serotina*).

As with the Northern Woods, the Southeast Woods is a diverse canopy community with abundant understory growth and ground cover, including New York Fern (*Thelypteris noveboracensis*) and Spicebush (*Lindera benzoin*).

The trails through this wooded area lead to the horse cemetery from the Hillandale Farms period. The remnants of recent construction exist in the northern part of the southeast woods, where a wet area was drained.

3.1.4. Central Woods

The Central Woods is a small forested area in the middle of the park. It is bordered by trails and fields.

The area is roughly defined as Oak-Tulip Tree Forest. It is common here to see multiple species of Oak congregated in a small area. Red Oak (*Quercus rubra*) and Black Oak (*Quercus velutina*) are co-dominant. Also common is the Shagbark Hickory (*Carya ovata*).

Understory trees and shrubs are common in this area, with limited ground cover due to the rocky nature, full canopy and hiking trails. Common understory species include Ironwood (*Carpinus caroliniana*), Maple-Leaf Viburnum (*Viburnum acerifolium*), and Crab Apple (*Malus sp.*). While sparse, there exist some ground cover, including White Wood Aster (*Aster divaricatus*), and in the open canopy areas Common St. Johnswort (*Hypericum perforatum*).

A small wet area previously existed within this section. In a 2007 project it was drained, with the effluent flowing towards the east. A large Pin Oak (*Quercus palustris*) stands at the northern end of the former wetland. This is one of the largest individuals of this species seen in the area, and should be monitored.

3.1.5. Sparse Woods

Within Ward Acres, intermittent wooded areas exist. While there are differences among them, they typically demonstrate one of two general characteristics.

The first, older growth areas, historically served as boundaries between fields during farming periods. They are filled with many canopy species, especially Maples and Oaks.

Other sparse wooded areas are more successional in nature, dominated by pioneer species such as Sassafras (*Sassafras albidum*), Tree-of-Heaven (*Ailanthus altissima*), and Mulberry (*Morus sp.*).

Invasive vine cover varies greatly among the sparse woods sections. Some are relatively clear due to adjacent conditions (i.e. trail patterns) while others are rife with invasives.

3.2. The Fields of Ward Acres

There are numerous fields found on the park's property. They have been maintained in a variety of ways, ranging from frequent mowing to being left fallow. Those with less active management have become dominated by invasive species. For the purposes of this management plan, the fields have been divided into 5 major areas. A discussion of the smaller fields located throughout the park is also present in this section or in section 3.1. Map 2 shows the locations and numbering of the fields.

3.2.1. Field 1

Field 1 is defined as the mowed area to the immediate west of the barn complex. It is rectangular in shape, with two utility poles and wires running through the southeast corner. There is a small tree island present. The field is defined as Mowed Lawn.

The edges of the field are lined with trees, primarily Black Cherry (*Prunus serotina*). On three of the four sides (excluding the eastern edge) there is heavy cover of Porcelain Berry (*Ampelopsis brevipedunculata*). Other

species exist on the edge, including Bladder Campion (*Silene vulgaris*), Orange Day Lily (*Hemerocallis fulva*), and Daisy Fleabane (*Erigeron annuus*).

3.2.2. Field 2

Field 2 is defined as the mowed area immediately to the north of the barn complex. This is the current dog run area. It is rectangular in shape with a small vegetation island separating two areas of the field. It is defined as Mowed Lawn.

The predominant tree species around the edges of the field is Norway Maple (*Acer platanoides*). There is abundant invasive growth on the edges, predominantly Mugwort (*Artemisia vulgaris*) and Porcelain Berry (*Ampelopsis brevipedunculata*). Some edges appear to have been maintained recently as dead vines can be seen hanging from trees.

The island is formed from a Norway Maple, along with honeysuckle bushes.

3.2.3. Field 3

Field 3 is defined as the mowed area to the west of Field 2 and north of Field 1. This is a secondary dog run, with less evidence of associated degradation. It is roughly rectangular in shape, with wood and shrubland edges, and is defined as Mowed Lawn.

As with many of the other fields, the edges are consistent with the Sparse Woods section above. There is heavy presence of invasive species along the edges, which seem to have been mowed within the last few years (particularly the southern edge). Mugwort (*Artemisia* vulgaris) is pervasive on all sides. Other species exist along the boundary, making the edges very similar to the Successional Shrubland discussed in section 3.2.4.

There is a small vegetation island towards the northern end of the field with two trees, a Black Cherry (*Prunus serotina*) and a White Mulberry (*Morus alba*). There is also heavy presence of honeysuckle (*Lonicera sp.*).

The northwest corner of the field rises on a small hill, and blends into the shrubland of field 4. Goldenrod (*Solidago sp.*) is dominant in this area.

3.2.4. Field 4

Field 4 is the largest field, with mowed and un-mowed areas. For the purposes of this plan, it includes the mowed areas to the southwest, as well as the unmowed areas which border field 3. See Map 2 for a detailed outline of the area. A very small percentage of this field is mowed, with most showing shrub or other woody growth.

As with the other fields, Field 4 is surrounded by trees, consistent with above. Pin Oak (*Quercus palustris*) is the dominant edge species, with a large specimen near the center of the field.

The field is defined as both Successional Shrubland and Successional Old Field due to differing areas. Some have more than 50% shrub cover (Shrubland), while cover is less than 50% in other areas. Numerous trees are scattered throughout the field, of differing age and size. The standing, mature trees are nearly completely covered in Porcelain Berry (*Ampelopsis brevipedunculata*), as are the shrubs and dead trees.

The Successional Shrubland areas of the field are predominantly covered in Porcelain Berry. There are scattered shrubs and small trees, including Pokeberry (*Phytolacca americana*), Honeysuckle (*Lonicera*, various species), Tree-of-Heaven (*Ailanthus altissima*), and Staghorn Sumac (*Rhus typhina*). Most are covered with Porcelain Berry.

The Successional Old Field areas contain most of the same species as above, but have a smaller percentage of shrubs. There is a higher presence of wildflower growth, including Dogbane (*Apocynum medium*), Common Milkweed (*Asclepias syriaca*), and Queen-Anne's Lace (*Daucus carota*).

3.2.5. Field 5

Field 5 is defined as the mowed field surrounding the farm house on the eastern border of the park. It is defined as Mowed Lawn.

Within the field itself are 3 White Pines (*Pinus strobus*). Grasses and White Clover (*Trifolium repens*) are the dominant species. The borders are very similar to those in the other fields, where Mugwort and Porcelain Berry surround, and with pioneer and canopy trees such as Sassafras, Ailanthus, Tulip, and Norway Maple forming the outer border.

As with other fields, wildflowers are mixed in along the edges. In this area they include Maryland Figwort (*Scrophularia marilandica*) and Blackberry (*Rubus sp.*). Butterflies and Damselflies were also observed.

3.3. The Water Bodies and Wetlands of Ward Acres

There is very little natural water within the park. Many of the historically natural streams and vernal pools were changed due to the farming history. Other alteration of water flow patters has occurred with the development of the surrounding lands.

3.3.1. Streams

A wetland corridor enters the western edge of the park at Broadfield Road, running in a northeasterly direction to its outflow at Pinebrook Boulevard. The corridor begins as a small, shallow pond, becoming an intermittent stream. It is defined as Intermittent Stream and Ditch / Artificial

Intermittent Stream as the water source is runoff from the surrounding developed land yet areas remain in their natural condition. Its path through the park is seen in Map 3.

A second corridor exists along the eastern boundary of the park, near the horse grave. It runs in an easterly direction and is a tributary of the Sheldrake River. It is defined as Intermittent Stream. A seasonally inundated area is concurrent with the corridor, adjacent to Pinebrook Boulevard. The corridor's path is seen in Map 3.

Wetland flora species are common within and around the wetland corridors, especially the above former. Species include: Spotted Jewelweed (*Impatiens capensis*), Royal Fern (*Osmunda regalis*), Spicebush (*Lindera benzoin*), and Red Maple (*Acer rubrum*). While there is little emergent vegetation within the ponded area, Cattail (*Typha latifolia*) does exist. In the shallow stream areas, trees are present with occasional ground cover of Skunk Cabbage (*Symplocarpus foetidus*).

3.3.2. Vernal Pools

There were no vernal pools observed. Some areas showed effects of seasonal inundation. Such seasonally wet areas may be defined as vernal pools upon future research. Further investigation is needed to determine if these are functioning wetlands, or simply depositions of water.

One area which might have functioned as a vernal pool, located along the eastern border of the park near the farm house, is an enclosed canopy area with seasonal water deposition. It has recently been drained via an installed underground pipe leading towards Pinebrook Boulevard.

4. Species of Special Concern

While there were no rare plants or animals found within the park, there are a few species of special concern. They are either locally unique, whether it be in population, presence or activity, or of concern due to their nature. Recommendations on these species will follow in Section 5.

4.1. Invasive Species

There are many native and non-native "invasive" species within Ward Acres. These are species which inhibit native biodiversity by taking over an area, thus creating a near mono-culture. They are problematic due to the reliance of native flora and fauna upon each other for survival.

Each invasive is unique in the processes used to dominate the landscape, from aggressive growth to chemically altering soil conditions. Thus, each must be treated differently. Management techniques for the most aggressive species listed below are discussed in the Management section (Section 6), with other resources listed or cited.

Porcelain Berry (*Ampelopsis brevipedunculata*) is a vine closely related to our native grapes (in the family Vitaceae). Introduced from eastern Asia in the late 1800's, it has been primarily used as garden planting due to the pastel-colored berries produced in the fall. Growing up to 15' per year, it is an extremely aggressive vine which can shade out native flora. The added weight will also make native trees and shrubs more prone to wind and ice damage. The fruit can be spread by birds. A large, strong taproot which spreads underground similar to a rhizome makes this species very hearty and difficult to control. This vine is still sold in nurseries in some states. In Ward Acres, Porcelain Berry can be found in every field area and some forested areas.

Oriental Bittersweet (*Celastrus orbiculatus*) is another vine introduced in the late 1800's from eastern Asia. While not as aggressive as the Porcelain Berry, this vine can have a detrimental effect on the wooded areas of the park. Growing up trees, the vine will enlarge as it ages, girdling or "strangling" the trees. It produces a berry which can be transported by birds through ingestion. In Ward Acres, Oriental Bittersweet can be found in the forested areas of the park.

Japanese Knotweed (*Polygonum cuspidatum*) is an eastern Asian species introduced in the mid 1800's. While it does have a winged seed, its most effective method of dispersal is through its rhizomes, which are strong and can spread over large areas. This helps the plant develop an underground network thus eliminating most other plants from the area. Its growth looks similar to bamboo, with hollow stems, and as a perennial can grow up to 10' tall each year. In Ward Acres, Japanese Knotweed is found in a field within the North Woods section of the park.

Mugort (*Artemisia vulgaris*) is a very aggressive plant native to Europe, Asia and parts of Africa. It takes over an area due to its rhizome, which can create an encompassing "mat". In historic times it was used to ward off insects, which is detrimental to creating faunal diversity at a park. It is present along the edges of most field areas within Ward Acres.

Common Reed (*Phragmites australis*) is a tall grass (family Poaceae) which is native to all continents of the world except Antarctica. While native populations do exist in the Northeast, they are very rare. Most of the Phragmites seen in this area is an introduced variety. Phragmites is a wetland obligate, relying on seasonally to permanently hydric soils. Phragmites can reach a height of 14' in a single growing season. It creates an underground mat due to its large, strong rhizomes. In Ward Acres, Phragmites is present in the field adjacent to the Central Woods section of the park, within the stream corridor.

Purple Loosestrife (*Lythrum salicaria*) is another invasive obligate wetland plant. While aesthetically pleasing due to its purple inflorescence, it is difficult to remove once established. Introduced in the early 1800's from Europe, it is common in salt and fresh water marshes throughout Westchester County. This species can spread quickly, producing up to 2.5 million seeds per plant (IPANE). Given time, it will produce a monoculture, excluding native species. In Ward Acres, Purple Loosestrife exists in the field along the wetland corridor.

Garlic Mustard (*Alliaria petiolata*) is a European species first introduced to the area in the late 1800's. This species is able to change soil characteristics by killing the mycorrhizal fungi which native trees rely upon for protection and nutrient transfer. The presence of this species may inhibit native tree and other native floral growth. In Ward Acres, Garlic Mustard is present in many of the fielded and forested areas.

Multiflora Rose (*Rosa multiflora*) is a perennial shrub native to Japan. First introduced to the U.S. in the late 1800's, it can spread through seed dispersal by birds. Once deposited, it creates a thorny thicket which out-competes native species. It is present within an area of the Northern Forest as well as within some fields.

Norway Maple (*Acer platanoides*) is a European tree introduced to the eastern U.S. in the 1700's. Dispersed by winged seeds, this species can out-compete the native trees due in part to its longer vegetative cycle, thus shading out competitors and native ground cover flora.

4.2. Deer

The White-Tailed Deer (*Odocoileus virginianus*) is a common mammal found throughout Westchester County. Increased numbers due to the extirpation of top predators and the amount of suitable habitat have led to browse issues. Wildflower and understory growth have been severely impacted in areas, leading to a reduction in forest regeneration.

Ward Acres is unique in Westchester due to its apparent lack of a large deer population. There is very little browse, and forested areas have a robust understory. While some evidence of deer is present, there seem to be relatively few individuals.

Populations should be monitored in the future to determine if there is an increase over time.

4.3. Dogs

Another species of special concern which has drawn a great deal of recent attention is the domestic dog (*Canis lupus*). The Master Plan included meetings in regards to the amount of off-leash activity. There have been numerous newspaper articles and much controversy over this subject.

Current regulations allow dogs off-leash before 10AM and in the late afternoons if the owners are in possession of a permit.

Part of the Master Plan is the proposed establishment of an enclosed dog run in Field 3 of this report. This would be a fenced-in area where dogs are allowed off leash.

For the purpose of this Management Plan, dogs will be looked at simply as any other fauna and therefore for their effect upon natural resources and not human interaction. As with most animals, dogs do not observe boundaries or recognize sensitive habitat. Being long-haired, they can easily transport invasive seeds from one area to another. They are a top predator, which can chase or otherwise negatively affect native fauna.

5. Management Recommendations

There are a number of Management Recommendations for Ward Acres Park in regards to the natural resources. Some are designed to manage against invasive species while others are designed to protect the significant species or habitats which exist within the park.

5.1. Biodiversity Reserve Area

For use in the Westchester County Department of Parks, Recreation and Conservation, a Biodiversity Reserve Area is defined as:

A biodiversity preserve is an area within the boundaries of a park that is recognized for its ecological significance. The purpose of establishing and protecting such areas is to preserve the overall biodiversity of the park. In selecting an area for a biodiversity preserve, decisions should be based on the overall unique environmental features of the site rather than the individual species occurring there (single-species preserves and rare species recovery projects should not be treated as biodiversity preserves). In the management of a biodiversity preserve, preservation of the site takes precedence over the other land-use concerns.

For Ward Acres Park, it is recommended that a Biodiversity Reserve Area be created around the North Woods section. As mentioned earlier, this area is very pristine, and unique to the wooded areas in lower Westchester County. A robust understory exists with saplings, showing active regeneration. There are many ground cover species which are associated with healthy mature forest and low deer browse, including Jack-in-the-Pulpit (*Arisaema triphyllum*).

This area should be managed in order to prevent invasive species growth, and could be an area fit for invasive species remediation projects. Any management of the area should be done by hand so as not to disturb the soil with heavy machinery. While two areas exist with invasive species presence, they are small in size and seemingly stable.

Further research should be conducted to determine whether the invasives are impeding on adjacent forested areas. Initial invasive species remediation projects should focus on these areas.

5.2. Invasive Species

The control of invasive species is an important aspect to best managing the natural resources of any park. Keeping species out which tend towards monoculture will help maintain the biodiversity necessary for a healthy environment and the robust habitats important to native fauna.

Whenever possible, removal of invasive species should be coupled with seeding or planting of native flora. Native species are available from local

nurseries or online stores specializing in northeast genotypes. Seeding can occur in the fall after mowing, or during the spring. Planting should occur in spring to avoid drought conditions.

Westchester County Parks promotes the reduction of pesticide applications and supports an Integrated Pest Management approach. A brochure on IPM can be found at http://www.westchestergov.com/health/PDF/PestManagement2.pdf.

Control methods of the most common invasive plants at Ward Acres follow below. As staffing and volunteer time are valuable and limited, control of all listed species may not be feasible. Priority species and areas should be determined. When possible, manual efforts should be used primarily. Licensed pesticide applicators and proper techniques should be utilized if chemical methods are prescribed. It is the opinion of the author that the invasive areas within the North Woods section of the park be targeted first, with fields adjacent to wooded areas being of second highest priority. Some species require season-specific management.

Vine management will help to maintain the integrity of the forested areas. A quadrant system can be employed, as described in section 5.4.

The work described in the following sections can be done by: a blitz method utilizing contracted work; staff time, or; volunteer efforts.

For further information on the management of these species, there is much information posted on the web, at such sites as http://www.nps.gov/plants/alien/fact.htm, http://tncweeds.ucdavis.edu/esadocs.html, and others.

Porcelain Berry is a common vine which has been managed at Westchester County-owned parks. Manual methods are recommended for Ward Acres.

Mechanical control of the species is best during winter and early spring, with an aggressive cutting regime. The vine should be cut at ground level and again at eye level, preventing reestablishment the following year. Cut vines can remain until they decompose naturally and fall off.

Any vines with berries should be disposed offsite to prevent dispersal. New shoots and growth can be pulled throughout the growing season if desired.

Chemical control has proven effective with this species. The recommended method is “clip and drip”, whereby the vine is cut at breast height and a small amount of herbicide is “painted” onto the cut section. This is best done in the fall when the plant is sending nutrients to the root stock.

Oriental Bittersweet Control of this species is aimed at reducing its impact on the trees, thereby retaining the characteristic of the forest. During the winter months, any Bittersweet seen should be cut at ground level and at eye level. Vines which have fruit should be disposed offsite. During the spring, new shoots can be pulled.

Japanese knotweed Various methods exist for control of this species, including mechanical, chemical and biological control.

The recommended method for Ward Acres is mechanical control. Knotweed has shown sensitivity to regular mowing. Areas with heavy presence should be mowed one to two times per month for a few years. Management in the North Woods section should avoid heavy machinery use (See Section 5.4)

Mugwort is present in nearly every field in Ward Acres Park. There is little known about effective approaches to controlling this species.

Hand pulling has been effective in small areas, but is physically demanding, and needs to be repeated each year. Staff or volunteer time may not be available. Annual mowing with selective spot mowing may be more feasible.

Chemical removal of Mugwort is more effective. "Clip and drip" methods have shown positive results when applied in the fall. Foliar spray is not recommended as it eliminates all floral growth. This method may however prove necessary.

Phragmites should be easier to control within Ward Acres due to its small population. While the plant shows response to controlled burns and manual clipping, the best success has been seen with chemical control. A "clip and drip" method can be used in the fall. A few years of repetition should show positive results.

Purple Loosestrife has a small population along the wet corridor. Mechanical control of such small populations has proven effective. The loosestrife should be removed as soon as possible to prevent establishment.

Manual pulling is best done during the growing season before it has gone to seed. As much of the root material as possible should be pulled. Weekly identification and pulling will work best.

Chemical spot spraying or "clip and drip" methods have also proven useful.

Garlic Mustard is not as dominant in Ward Acres. Manual pulling methods are recommended. The entire plant should be pulled in the spring and summer months, before it goes to seed. Garlic Mustard is easy to pull, as its roots do not establish a firm hold. Because of the ability of the seeds to stay viable in the soil for extended periods of time, regular maintenance is necessary.

Multiflora Rose While the seeds are easily transported through ingestion of the berries by birds, it tends to grow slowly.

Manual control methods have shown positive results. The shrubs can be cut or mowed at any time of year. The best results have been found in cutting or mowing the shrub during the growing season for a few years.

Norway Maple is a naturalized species at Ward Acres Park. It is present in most sections of the park, and there doesn't seem to be much change associated with the species as few Norway Maple saplings were observed. The easiest management of this species is to remove the saplings with a weed wrench as they emerge. Inspection of the sap from the leaf stem helps in determining the difference between this and other species of Maple as the sap has a milky-white color.

5.3. Fields

Native Meadows support a tremendous biodiversity, especially on habitat edges. It is recommended that many of these meadows be retained for their support of the native fauna. While succession is occurring in one of the fields, most are mowed at regular intervals.

The numerous fields listed above have varying degrees of invasive species. While each should be managed differently, a few techniques apply to all:

Each field's boundaries should be mowed once per year in the fall (October-November) to a height of six (6) inches. This will help disperse grass and wildflower seeds, and will occur at a time when there are no ground nests present. A native wildflower mix can be spread following cutting. Current mowing of lawn areas can continue, or if a field is to be reverted to meadow, then mowed once per year as above. Porcelain Berry and Bittersweet should be cut from any tree along the border or within the field during the winter months as described in section 5.2.

Field 1 edges should be mowed once per year in order to reduce Porcelain Berry cover. All vines should be trimmed during the winter months, especially those which threaten the trees immediately surrounding the field. Invasive vine growth should be removed from the power lines and utility poles. All other mowing can continue as needed.

Field 2 is the area proposed to be a fenced-in dog run area. Maintenance of this field would vary greatly depending upon the size and placement of this dog run. The trees along the edges should be cleared of vines during winter as described in section 5.2. A mowing schedule would depend upon the future use of the field. Meadow areas outside the dog run fence would need to be mowed once per year in the fall, with ground vine cutting in the winter. The small island should be removed of Honeysuckle and the tree area cleared of invasive ground cover. If aesthetically pleasing plants are desired, a small garden of native wildflowers can be created around the tree with a low fence to protect from rabbit browse and dog trampling.

Field 3 edge trees should be cleared of vines in the winter (see Section 5.2) and edge areas mowed once per year in the fall as above. There is an island towards the southern end with Black Cherry and White Mulberry trees. The low shrub vegetation should be cleared to create a "shade tree island". This will open up the field visually, and remove the invasive species present. A small wildflower garden can be created for aesthetics if desired.

Field 4 has the most pervasive presence of the nuisance species. There are 2 recommended options for this field, which can be used for the entire field or for sections.

Option 1 would revert the field to meadow with a similar management protocol as above. An initial mowing would be needed to reduce Porcelain Berry cover,

and manual techniques to remove vines from standing trees and shrubs. Once established as a field, winter trimming of vines and fall mowing can occur.

Option 2 would be to allow this field to become forest by promoting woody growth in either a more or less active way. Less active methods include trimming the vines from standing trees or shrubs using the methods described in 5.2. Porcelain Berry should be trimmed along the ground during the winter. If the field is not mowed, trees and shrubs will begin to emerge. These should be allowed to remain standing, and be cleared of invasive vine.

A more active approach would be to mow the area completely and plant tree saplings. The trees selected should be native and fit for the soil qualities of the area. Black Oak (*Quercus velutina*) and Sugar Maple (*Acer saccharum*) are two suggested species. The area can then be mowed once per year with any vine growth being cut. This will allow the trees to mature and dominate the area. This method would require a "blitz" technique, employing an outside contractor.

5.4. Forests

The forests of Ward Acres show varying degrees of invasive growth. The manual techniques described in 5.2 apply. Best done in winter, a vine cutting regimen will help to save trees from being overgrown or killed. As the vines tend to grow slowly, a quadrat technique is suggested, whereby the park is divided into quarters. Vine cutting should focus on one quadrat per year, to maintain an open crown for the trees.

As mentioned in section 3.1.4, there is a Pin Oak in the Central Woods section of the park which should be monitored as it is a uniquely large individual of this species.

Within the forests, a few problem areas exist which require more aggressive control.

North Woods A Knotweed and Porcelain Berry community exists in the western part of the North Woods. Research is needed to determine if it is encroaching on the surrounding woods. The Porcelain Berry in this area should be cut in the winter. Two options for Knotweed management are: To weed-whack 3-4 times per growing season, or; to weed-whack during early summer, which may not eliminate the species but instead allow other native growth. (Weed-whackers are preferred so as to not bring heavy machinery into the area)

A second area in need of management exists by the Broadfield Road-cut along the blue trail. This area is predominantly Multiflora Rose, which should be cut as low as possible 2-3 times per year during the growing season. Any Porcelain Berry in the area should be cut as low to the ground as possible during winter.

A third area exists along the wet corridor, possibly connected to the knotweed area described above. There is a presence of Purple Loosestrife and

Phragmites, although relatively small. Loosestrife should be removed using a weed wrench before it goes to seed (before mid-August). Phragmites can be hand-pulled or removed with chemical herbicide using the "clip and drip" method. Since there is a small population of each of these species in this area, removing them before they become established should be a priority and should return positive results.

Southwest Woods Due to the successional nature of the Southwest Woods, they should be closely monitored for invasive growth. Vines should be cut in winter as described in 5.2 in order to promote hardwood forestation.

5.5. Dog Areas

In the Master Plan a dog run is suggested. Aside from creating this, other recommendations in regards to dogs are suggested.

5.5.1. Dog Run

The proposed dog run is designed to keep unleashed dogs to a specific area. Unleashed dogs have a strong tendency to "go exploring", venturing into fields, streams, wetlands, forests and sensitive areas. As such, they become a vector for seed dispersal. By limiting off-leash activity, the risk of transporting the seeds to sensitive areas is lessened. Therefore it is recommended that the fenced-in dog area be created. As with any other regulation, enforcement is a key to its success.

5.5.2. Dog vs. No-Dog Areas

Even with leash laws in effect, some dogs are seen off-leash. In order to best prevent seed dispersal in the sensitive areas of the park, a no-dog area should be created. This would encompass the North Woods section of the park, the recommended biodiversity reserve area. (See Map 4) By limiting dog access to this area, the risk of invasive species seed dispersal is lessened.

5.6. Friends Group / Volunteer Group

The maintenance and habitat management requirements of a park this size often exceed the staffing abilities and budgeting. The use of volunteer programs and groups has been an effective method to combat these pressures. The establishment of a friends group allows for a panel of interested and affected parties to collectively influence the park in positive ways. An incorporated friends group can raise money to help alleviate some of the budgeting problems associated with park management, and can act as a source for volunteer recruitment.

Volunteers would be a welcome addition. The amount of vine cutting and other invasive removal is a daunting task. A group of committed volunteers who can feel pride and ownership in the park would do much to lessen budgetary pressures. An example of one such program can be seen at www.vinecutter.com.

A Friends group can be created from existing interested parties, including many of those mentioned in the Master Plan (Vollmer, 2006) as part of the Steering Committee.

5.7. Farm House

The farm house is an underused, dilapidated building in the eastern section of the park which has tremendous potential. It would be an ideal place for a park headquarters building, and could function in other ways.

Many parks have nature centers which serve multiple purposes: to educate the public; educate in regards to local species; inform of the rules and regulations; exhibit educational brochures and displays; act as classroom space for educational or school groups; act as a public meeting place for local organizations or friends groups; and act as an office for a land manager or superintendent.

Because of the location and size of the farm house on the Ward Acres property, this building would be ideal for all of these. Given the nature of the house, it may even serve as living quarters for a resident land manager.

6. References

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Biodiversity List
Ward Acres Park

Species are listed according to scientific nomenclature
NN refers to species being non-native
More research is needed to complete list

Lichens

Ceratiomyxa fruticulosa
Flavoparmelia caperata
Physcia millegrana

Vascular Plants

Osmundaceae (Flowering-Fern Family)

Osmunda cinnamomea	Cinnamon Fern
Osmunda claytoniana	Interrupted Fern
Osmunda regalis	Royal Fern

Aspleniaceae (Spleenwort Family)

Athyrium asplenioides	Lady Fern
Onoclea sensibilis	Sensitive Fern
Polystichum acrostichoides	Christmas Fern
Thelypteris noveboracensis	New York Fern

Pinaceae (Pine Family)

Pinus strobus	White Pine

Cupressaceae (Cypress Family)

Juniperus virginiana	Red Cedar

Magnoliaceae (Magnolia Family)

Liriodendron tulipifera	Tulip Tree

Lauraceae (Laurel Family)

Lindera benzoin	Spicebush
Sassafras albidum	Sassafras

Ranunculaceae (Crowfoot Family)

Actaea pachypoda		White Baneberry
Ranunculus acris		Common Buttercup
Ranunculus bulbosus		Bulbous Buttercup
Ranunculus sp.		Buttercup
Thalictrum pubescens		Tall Meadow Rue

Platanaceae (Plane-Tree Family)

Platanus occidentalis		Sycamore

Hamamelidaceae (Witch-Hazel Family)

Hamamelis virginiana		Witch Hazel
Liquidambar styraciflua		Sweet Gum

Ulmaceae (Elm Family)

Ulmus sp.		Elm

Moraceae (Mulberry Family)

Morus alba	NN	White Mulberry
Morus rubra		Red Mulberry

Urticaceae (Nettle Family)

Boehmeria cylindrica		False Nettle

Juglandaceae (Walnut Family)

Carya cordiformis		Bitternut
Carya ovata		Shagbark Hickory

Fagaceae (Beech Family)

Fagus grandifolia		American Beech
Quercus alba		White Oak
Quercus palustris		Pin Oak
Quercus rubra		Red Oak
Quercus velutina		Black Oak

Betulaceae (Birch Family)

Betula lenta		Black Birch

Carpinus caroliniana		Ironwood
Corylus Americana		American Hornbeam

Phytolaccaceae (Pokeweed Family)

Phytolacca americana		Pokeweed

Chenopodiaceae (Goosefoot Family)

Chenopodium album	NN	Lamb's-Quarters

Caryophyllaceae (Pink Family)

Silene latifolia	NN	White/Bladder Campion

Polygonaceae (Buckwheat Family)

Polygonum cespitosum	NN	Long-Bristled Smartweed
Polygonum cuspidatum	NN	Japanese Knotweed
Polygonum persicaria	NN	Lady's Thumb
Polygonum virginianum		Jumpseed
Polygonum sp.		Smartweed
Rumex acetosella	NN	Sheep Sorrel
Rumex crispus	NN	Curly Dock
Rumex sp.		Dock

Clusiaceae (Mangosteen Family)

Hypericum perforatum	NN	Common St. Johnswort

Tiliaceae (Linden Family)

Tilia americana		Basswood

Violaceae (Violet Family)

Viola sp.		Violet

Cucurbitaceae (Gourd Family)

Sicyos angulatus		Bur Cucumber

Salicaceae (Willow Family)

Populus deltoides		Cottonwood
Salix babylonica	NN	Weeping Willow

Salix caprea	NN	Goat Willow
Salix fragilis		Crack Willow

Brassicaceae (Mustard Family)

Alliaria petiolata	NN	Garlic Mustard
Lepidium virginicum		Poor-Man's Pepper

Clethraceae (White Alder Family)

Clethra alnifolia		Sweet Pepperbush

Styracaceae (Storax Family)

Halesia carolina	NN	Silver Bells

Crassulaceae (Sedum Family)

Sedum sp.	NN	Sedum

Rosaceae (Rose Family)

Duchesnea indica	NN	Indian Strawberry
Geum canadense		White Avens
Malus sp.	NN	Crab Apple
Potentilla sp.		Cinquefoil
Prunus serotina		Black Cherry
Rhodotypos scandens	NN	Jetbead
Rosa multiflora	NN	Multiflora Rose
Rubus phoenicolasius	NN	Wineberry
Rubus sp.		Blackberry

Fabaceae (Bean Family)

Robinia pseudo-acacia	NN	Black Locust
Trifolium repens	NN	White Clover

Lythraceae (Loosestrife Family)

Lythrum salicaria	NN	Purple Loosestrife

Onagraceae (Evening Primrose Family)

Circaea sp.		Enchanter's Nightshade

Nyssaceae (Tupelo Family)

Nyssa sylvatica		Black Gum / Tupelo

Cornaceae (Dogwood Family)

Cornus alternifolia		Alternate-leaved Dogwood
Cornus sp.		Unidentified Dogwood

Celastraceae (Staff-Tree Family)

Celastrus orbiculata	NN	Oriental Bittersweet
Euonymus alata	NN	Winged Euonymus

Buxaceae (Boxwood Family)

Buxus sempervirens	NN	Boxwood
Pachysandra terminalis	NN	Pachysandra

Vitaceae (Grape Family)

Ampelopsis brevipedunculata	NN	Porcelain Berry
Parthenocissus quinquefolia		Virginia Creeper
Vitis labrusca		Fox Grape

Aceraceae (Maple Family)

Acer negundo		Box Elder
Acer norvegica		Norway Maple
Acer rubrum		Red Maple
Acer saccharum		Sugar Maple

Anacardiaceae (Sumac Family)

Toxicodendron radicans		Poison Ivy

Simaroubaceae (Quassia Family)

Ailanthus altissima	NN	Tree-of-Heaven

Oxalidaceae (Oxalis Family)

Oxalis stricta		Yellow Wood Sorrel

Geraniaceae (Geranium Family)

Geranium maculatum		Wild Geranium
Balsaminaceae (Touch-Me-Not Family)		
Impatiens capensis		Spotted Jewelweed
Araliaceae (Ginseng Family)		
Aralia spinosa		Devil's Walking Stick
Hedera helix	NN	English Ivy
Apiaceae (Carrot Family)		
Cryptotaenia canadensis		Honewort
Daucus carota	NN	Queen-Anne's Lace
Zizia aurea		Golden Alexanders
Apocynaceae (Dogbane Family)		
Apocynum sp.		Dogbane
Asclepiadaceae (Milkweed Family)		
Asclepias sp.		Milkweed
Asclepias syriaca		Common Milkweed
Solanaceae (Nightshade Family)		
Solanum dulcamara	NN	Bittersweet Nightshade
Convolvulaceae (Morning-Glory Family)		
Convolvulus arvensis	NN	Field Bindweed
Calystegia sepium		Hedge Bindweed
Plantaginaceae (Plantain Family)		
Plantago lanceolata	NN	English Plantain
Plantago major	NN	Broad-leaf Plantain
Oleaceae (Olive Family)		
Fraxinus americana		White Ash
Scrophulariaceae (Figwort Family)		
Linaria vulgaris	NN	Butter-and-Eggs

Scrophularia lanceolata		Maryland Figwort
Veronica sp.		Speedwell

Bignoniaceae (Bignonia Family)

Campsis radicans	NN	Trumpet Creeper

Caprifoliaceae (Honeysuckle Family)

Lonicera japonica	NN	Japanese Honeysuckle
Lonicera maackii		Amur Honeysuckle
Lonicera tatarica	NN	Tartarian Honeysuckle
Sambucus sp.		Elderberry
Viburnum acerifolium		Maple-Leaf Viburnum
Viburnum dentatum	Rare	Southern Arrowwood
Viburnum sp.		Arrowwood

Asteraceae (Aster Family)

Ambrosia trifida		Giant Ragweed
Arctium sp.	NN	Burdock
Artemisia vulgaris	NN	Mugwort
Aster divaricatus		White Wood Aster
Aster lowrieanus		Lowrie's Aster
Cichorium intybus	NN	Chicory
Erigeron annuus		Daisy Fleabane
Eupatorium maculatum		Spotted Joe-Pye Weed
Hieracium caespitosum	NN	King Devil
Lactuca hirsuta		Hairy Lettuce
Matricaria matricarioides	NN	Pinapple-Weed
Solidago sp.		Goldenrod
Solidago gigantea		Late Goldenrod
Taraxacum officinale	NN	Common Dandelion

Araceae (Arum Family)

Arisaema triphyllum		Jack-in-the-Pulpit
Symplocarpus foetidus		Skunk Cabbage

Commelinaceae (Dayflower Family)

Commelina communis	NN	Asiatic Dayflower

Juncaceae (Rush Family)

Juncus sp.		Rush

Juncus tenuis		Path Rush

Cyperaceae (Sedge Family)

Carex sp.		Sedge
Carex sp.		Nuttall's Sedge

Poaceae (Grass Family)

Bromus sp.		Brome Grass
Dactylis glomerata	NN	Orchard Grass
Phragmites australis		Common Reed

Liliaceae (Lily Family)

Allium canadense		Wild Onion
Allium tricoccum		Wild Leek
Hemerocallis fulva	NN	Orange Day Lily
Polygonatum biflorum		Solomon's Seal
Smilacina racemosa		False Solomon's Seal
Veratrum viride		False Hellebore

Smilacaceae (Greenbrier Family)

Smilax rotundifolia		Greenbrier

Coleoptera

Coccinellidae

Coccinella septempuctata	NN	Ladybird Beetle

Odonata

Zygoptera (Damselflies)

Calopteryx maculata		Ebony Jewelwing

Lepidoptera

Papilio glaucus		Tiger Swallowtail
Papilio troilus		Spicebush Swallowtail
Pieris rapae	NN	Cabbage White
Vanessa atalanta		Red Admiral

Amphibia

Ranidae (True Frogs)

Rana clamitans	Green Frog

Aves

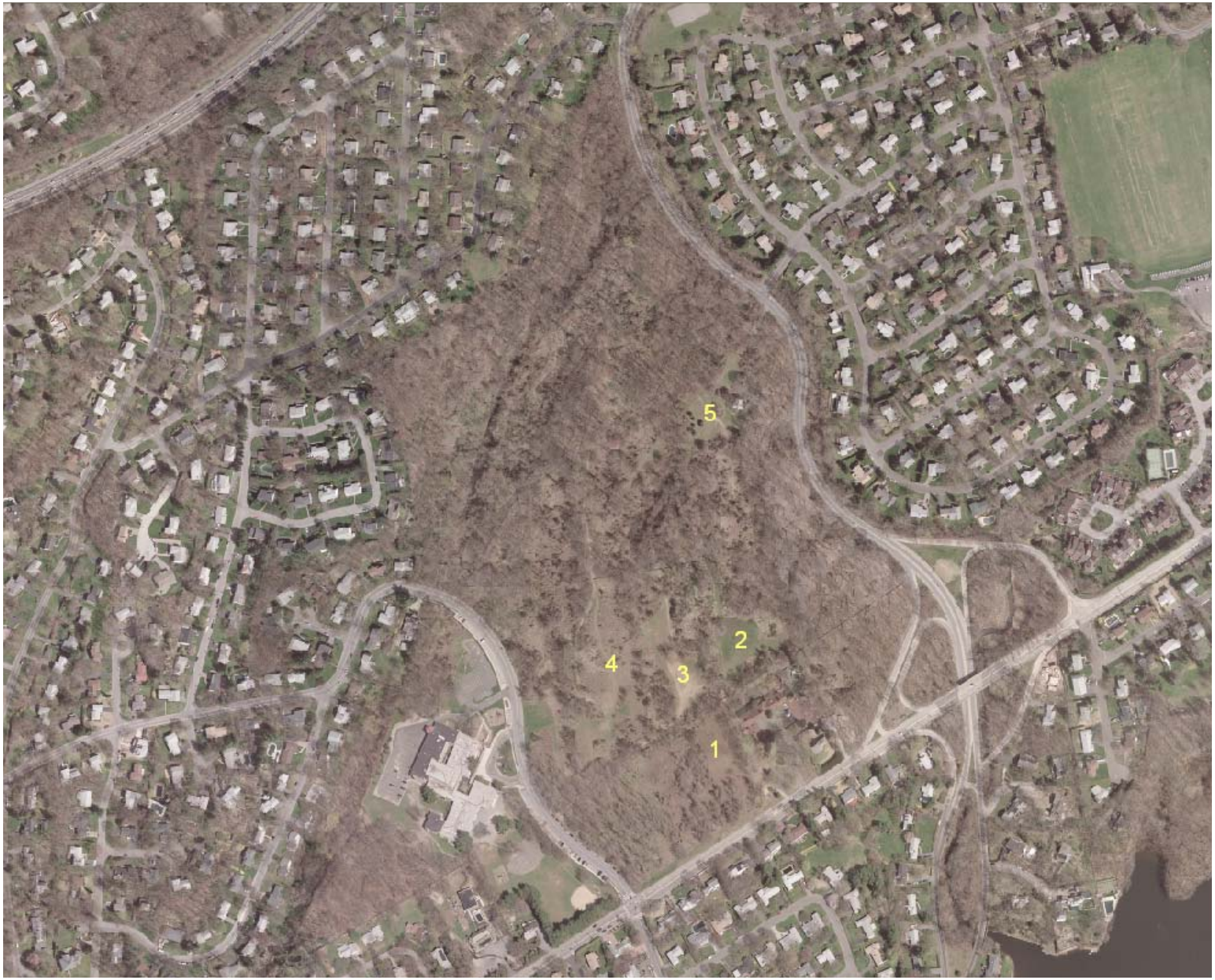
Cardinalis cardinalis	Northern Cardinal
Dendroica fusca	Blackburnian Warbler
Dendroica magnolia	Magnolia Warbler
Dendroica petechia	Yellow Warbler
Dumetella carolinensis	Gray Catbird
Hylocichla mustelina	Wood Thrush
Icterus galbula	Baltimore Oriole
Melanerpes carolinus	Red-Bellied Woodpecker
Picoides pubescens	Downy Woodpecker
Thryothorus ludovicianus	Carolina Wren
Troglodytes aedon	House Wren
Turdus migratorius	American Robin
Vireo gilvus	Warbling Vireo
Vireo olivaceus	Red-Eyed Vireo

Mammalia

Sciurus carolinensis	Eastern Gray Squirrel
Tamias striatus	Eastern Chipmunk

Map 1: Forested Areas of Ward Acres

Map 2: Numbered Fields of Ward Acres



Map 3: Wetland Corridors

Map 4: Proposed Biodiversity Reserve Area